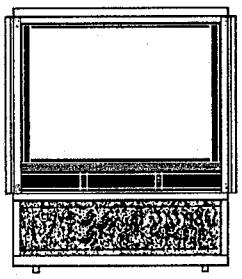
Service Manual

PIONEER®
The future of sound and vision.



ORDER NO.
ARP1869

PROJECTION MONITOR RECEIVER

SD-P503P-QD
SD-P503P-Q
SD-P503P-WD
SD-P503P-W
SD-P503P-R
SD-P503S-Q
SD-P503FP-Q
PRO-92
SD-P453P-Q
SD-P453P-W
SD-P453S-Q
SD-P453FP-Q
PRO-72

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MODELS OF THE FOLLOWING TABLES HAVE TWO VERSIONS :

Type	Applicable model (Appearance is indicated in the ( ).)				Power requirement	Export destination
	SD-P503P-QD (oak with door)	SD-P503P-Q (oak without door)	SD-P503P-WD (walnut with door)	SD-P503P-W (walnut without door)		
KUX1C	○	○	○	○	AC 120V only	U. S. A ＊1

Type	Applicable model (Appearance is indicated in the ( ).)				Power requirement	Export destination
	SD-P503P-R (rosewood without door)	SD-P503S-Q (oak without door)	SD-P503FP-Q (oak without door)	PRO-92 (black without door)		
KUX1C	○	○	○	○	AC 120V only	U. S. A ＊1
KC	○	—	—	—	AC 120V only	Canada

Type	Applicable model (Appearance is indicated in the ( ).)					Power requirement	Export destination
	SD-P453P-Q (oak without door)	SD-P453P-W (walnut without door)	SD-P453S-Q (oak without door)	SD-P453FP-Q (oak without door)	PRO-72 (black without door)		
KUX1C	○	○	○	○	○	AC 120V only	U. S. A ＊1

＊1 ; On KUX1C type

The KUX1C type comes in two versions : the one is manufactured by Harvey Manufacturing, Inc. (having "T" at the end of the serial number), and the other is manufactured by PIONEER ELECTRONICS TECHNOLOGY, INC. (having "L" at the end of the serial number).

Some of the parts of these two versions differ one from the other. For the differences, refer to the notes shown in "EXPLODED VIEWS, PACKING AND PARTS LIST" and "CONTRAST OF MISCELLANEOUS PARTS" of this service manual and the additional service manual.

- **This manual is applicable to the above-cited types except for KC type.**
- **For the SD-P503P-Q, SD-P503P-WD, SD-P503P-W, SD-P503P-R, SD-P453P-Q and SD-P453P-W/KUX1C types, refer to pages 157.**
- **For the SD-P503FP-Q, PRO-92, SD-P453FP-Q and PRO-72/KUX1C types, refer to pages 159.**
- **For the SD-P503S-Q and SD-P453S-Q/KUX1C types, refer to pages 165.**
- **For the other types, refer to additional service manual.**
- **This service manual is combined with operating instructions (page 1 to page 56) at the end of this manual.**

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You must read the SAFETY PRECAUTIONS, the PRODUCT SAFETY NOTICE and the CHARGED SECTION, HIGH VOLTAGE GENERATING POINT AND X-RAY PROTECTION befor servicing.

1. SAFETY PRECAUTIONS

NOTICE : Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis or picture tube.

The following precautions should be observed :

1. Do not install, remove, or handle the picture tube in any manner unless shatterproof goggles are worn. People who do not wear them should be kept away while picture tubes are handled.
   Keep picture tube away from the body while handling.
2. When service is required, even though the SD-P503P-QD, an isolation transformer should be inserted between power line and the set in safety before any service is performed.
3. When replacing a chassis in the set, all the protective devices must be put back in place, such as barriers, nonmetallic knobs, adjustment and compartment covershields, isolation resistor-capacitor, etc.
4. When service is required, observe the original lead dress.
   Extra precaution should be taken to assure correct lead dress in the high voltage circuitry area.
5. Always use the manufacturer's replacement components.
   Especially critical components as indicated on the circuit diagram should not be replaced by other manufacture's.
   Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.
6. Before returning a serviced set to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the set by the manufacturer has become defective, or inadvertently defeated during servicing.

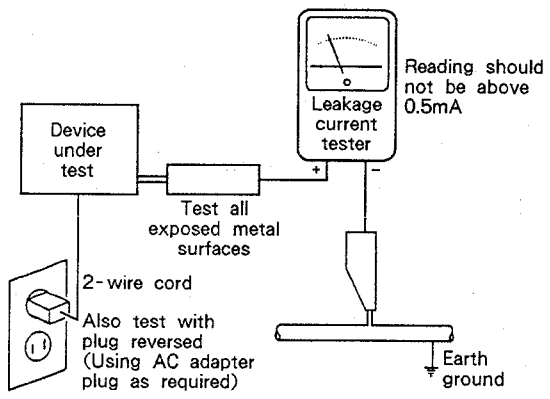
Therefore, the following checks should be performed for the continued protection of the customer and service technician.

Leakage Current Cold Check

With the AC plug removed from the 120V AC 60Hz source, place a jumper across the two plug prongs. Turn the AC power switch on. Using an insulation tester (DC 500V), connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (input/output terminals, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistor reading of 0.3MΩ and a maximum resistor reading of 5MΩ. Any resistor value below or above this range indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a 120V AC 60Hz outlet (Do not use an isolation transformer for this check). Turn the AC power switch on. Using a "Leakage Current Tester (Simpson Model 229 equivalent)", measure for current from all exposed metal parts of the cabinet (input/output terminals, screwheads, metal overlays, control shaft, etc.), particularly any exposed metal part having a return path to the chassis, to a known earth ground (water pipe, conduit, etc.). Any current measured must not exceed 0.5mA .



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE SET TO THE CUSTOMER.

High Voltage

This set is provided with a hold down circuit for clearly indicating that voltage has increased in excess of a predetermined value. Comply with all notes described in this Service Manual regarding this hold down circuit when servicing, so that this hold down circuit may correctly be operated.

SERVICEMAN WARNING

High voltage (31.8kV) will remain at anode of the picture tube for a long period after turning power off even more than one or two weeks.
In this state, it will be really dangerous if any kind of operation which has a risk of electric shock at anode is carried out ; such as replacement of the picture tube (CRT assembly R, G, B) or exchanging and removing an anode cable.
When these kinds of operations are required, be sure to discharge anode voltage following the procedure of "Discharge of anode voltage", page 7.

X-ray radiation

TUBE : The primary source of X-ray radiation in this set is the picture tube.
For continued X-ray radiation protection, the replacement tube must be the same type as the original, PIONEER approved type.
The picture tube (CRT assembly R, G, B) used in this set holds complete guarantee against X-ray radiation when the X-ray is sealed (See on page 6). Accordingly, when the current in flowing to the picture tube (CRT assembly R, G, B), be sure to perform it by putting the tube into X-ray sealed applied state. Never supply the current to the picture tube (CRT assembly R, G, B) without having X-ray sealed. Moreover, when the voltage of the high voltage circuit becomes higher above the normal range, the picture tube radiates X-rays. Accordingly, when servicing the high voltage circuit, be sure to replace as an assembly with the DEFLECTION assembly (AWV1079) in the manner in which has been adjusted to perform normal operation.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in PIONEER sets have special safety related features and characteristics. These features often do not become evident upon visual inspection nor the protection afforded by them, necessarily, can be obtained by using replacement components rated even for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified with ⚠ and ☆ marks on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create a risk of shock, fire, X-ray radiation, or other hazards.
Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the most current PIONEER Service Manual. A subscription to, or additional copies of PIONEER Service Manuals may be obtained at a nominal fee from PIONEER.

3. CHARGED SECTION, HIGH VOLTAGE GENERATING POINT AND X-RAY PROTECTION

■ Charged section

The circuit in which the commercial AC power is used as it is without passing through the power supply transformer. If the charged section is touched, there is a risk of electric shock. In addition, the measuring equipment can be damaged if it is connected to the GND of the charged section and the GND of the non-charged section while connecting the set directly to the commercial AC power supply. In this case, be sure to connect the set via an insulated transformer and supply the current.

■ Charged section (Power supply primary side)

1. The primary side of the DEFLECTION assembly AWV1079
2. AC power cord ADG1056
3. R1, R2 wire-wound resistor (0.47/20W) ACN1058

part is the charged section.
part is the high voltage generating points other than the charged section.

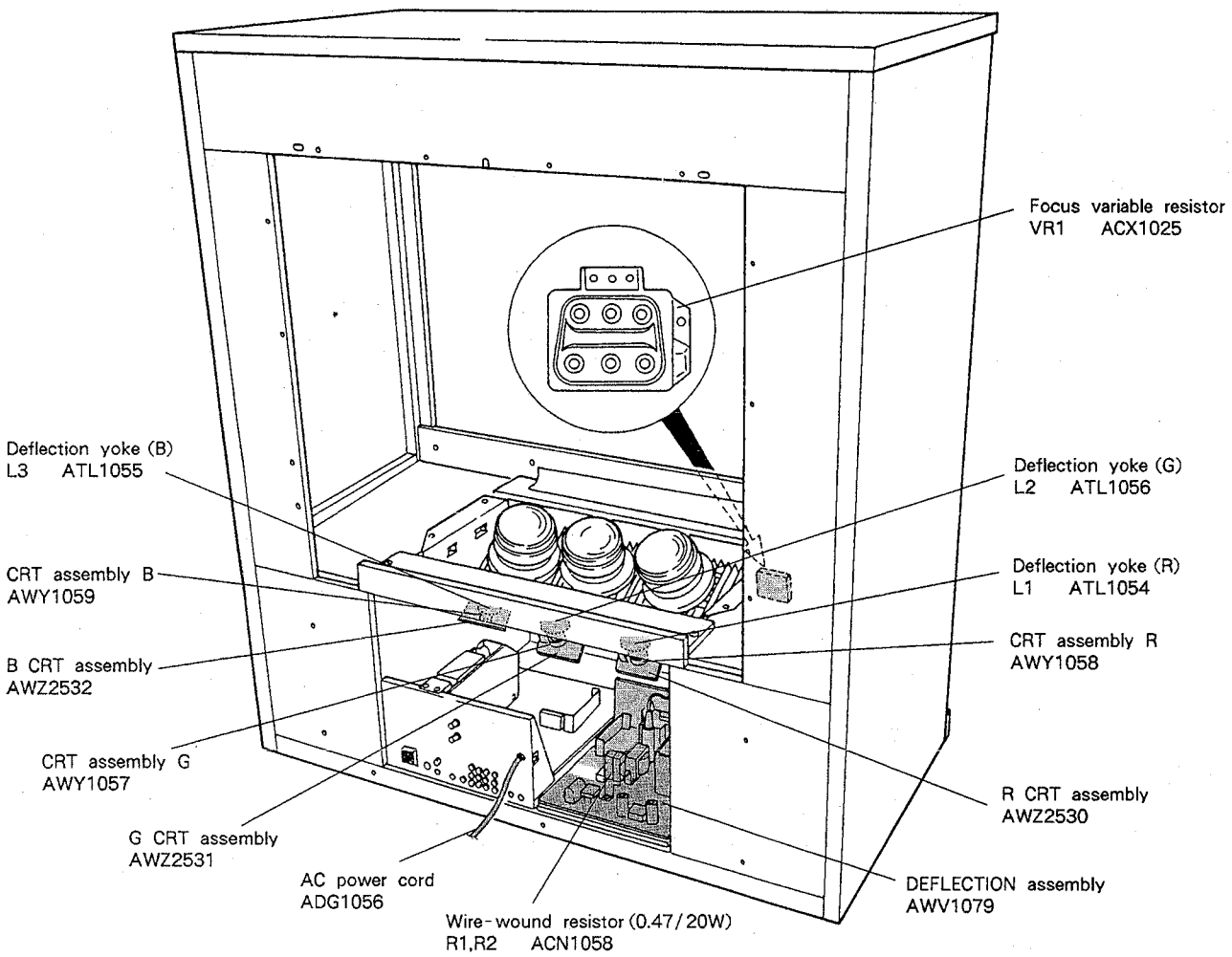


Fig. 3-1 Charged section and high voltage generating point

■ High voltage generating point

The place where voltage of over 100V is generated.

1. Charged section
2. DEFLECTION assembly
   (including FBT)
   AWV1079 (31.5kV, 135V)
3. R CRT assembly
   AWZ2530 (10.5kV)
4. G CRT assembly
   AWZ2531 (10.5kV)
5. B CRT assembly
   AWZ2532 (10.5kV)
6. CRT assembly R
   AWY1058 (31.5kV)
7. CRT assembly G
   AWY1057 (31.5kV)
8. CRT assembly B
   AWY1059 (31.5kV)
9. Focus variable resistor (VR1)
   ACX1025 (10.5kV)
10. Deflection yoke
    ATL1054 (L1 : R)
    ATL1056 (L2 : G) (Approx. 1200V at peak)
    ATL1055 (L3 : B)

■ X-ray protection

- Regarding the parts which are relative to radiation of X-rays (There is the danger to radiate X-ray from the individual CRT assembly R, G, B), there are notifications of caution in the individual schematic diagrams. Be sure to read them for safety's sake.
- The component parts for X-ray protection are as follows : When the current flows to the CRT assembly R, G, B, be sure to perform it with these parts being attached. Protection from the X-ray radiation is maintained in the state in which these parts have been installed to the CRT assembly R, G, B. Accordingly, never supply current only to the CRT assembly R, G, B.
  Moreover, the anode voltage of the CRT assembly R, G, B should always be kept not higher than the predetermined value (in the minimum brightness and picture state when non signal input is higher than 31.8kV). Be sure to drive the CRT assembly R, G, B by using a completely functional DEFLECTION assembly (AWV1079) which has been adjusted completely in the combined state.(When the voltage abnormally becomes high, the X-ray protection circuit will operate.)

1. CRT assembly R, G, B (Do not dismantle CRT assemblies under any circumstances).
2. Lens assembly 50 (GB), (R)

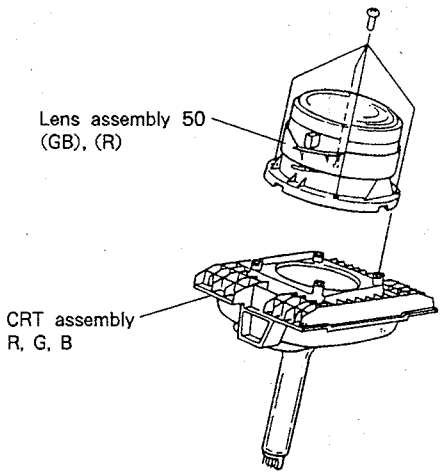


Fig. 3-2 Component parts for X-ray protection

4. DISCHARGE OF ANODE VOLTAGE

1. Turn off the POWER switch, and disconnect the AC power cord from the AC outlet for safety.
2. Disconnect the connector M2 in the R CRT assembly. (In order to protect power supply circuit for the heater.)
3. Apply the direct current (either + or −) of 6.3V and over 690mA between the HT + and HT − terminals in the B CRT assembly.
4. After more than 30 seconds have elapsed, short-circuit the TP-GK and GND terminals in the G CRT assembly. If the anode voltage has been left high, the center of the picture glows in circle, and goes off gradually. (Repeat steps 1 to 4, and the anode voltage of approx. 30 kV will drop to aprrox. 10 kV.)
5. Remove the anode cable from the flyback transformer (T553) as shown in Fig. 4-2. Be careful not to touch your hand or a part of your body to the tip of the anode cable.
6. Short-circuit the tip of the anode cable to the meshed wire portion of the CRT Assembly (or to the earth terminal screw to which the CRT Assembly is attached).
7. Connect the anode cable to the flyback transformer (T553) again for discharge the remain-high voltage in the flyback transformer.
8. Repeat steps 5 to 7 over three times, complete discharge of anode voltage.

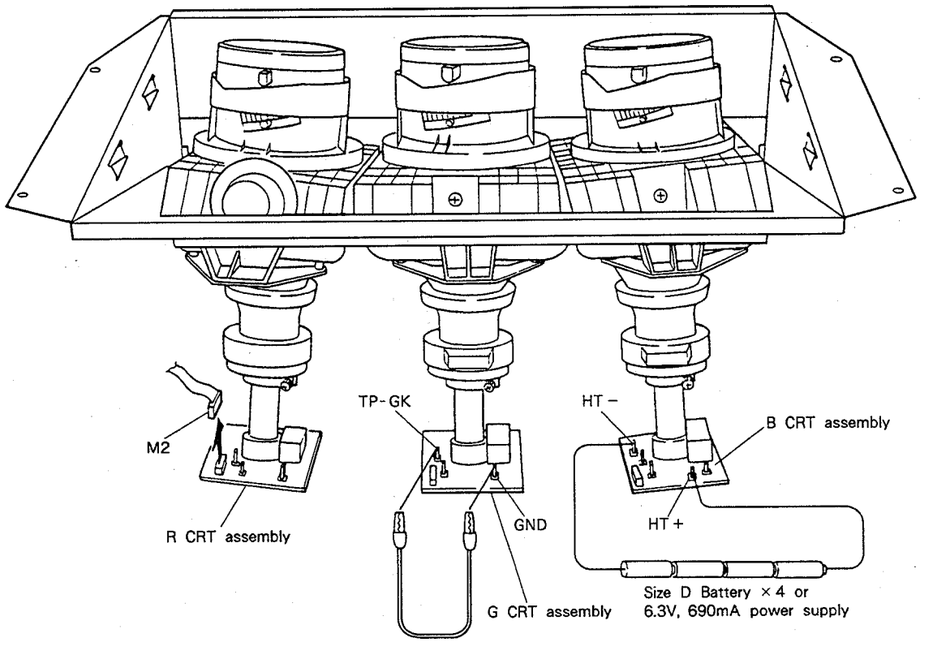


Fig. 4-1 Discharge of anode voltage (1)

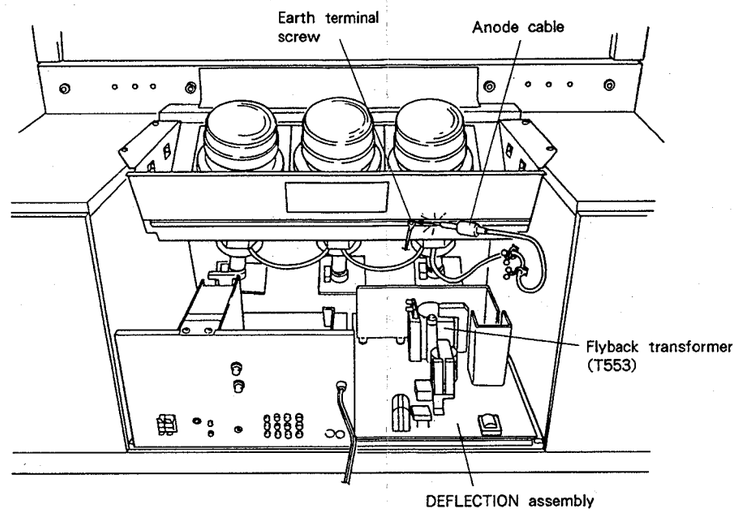


Fig. 4-2 Discharge of anode voltage (2)

5. DISASSEMBLY

● Removal of the side panel assembly

1. Remove the grille.
2. Insert your fingers into the holes Ⓐ and Ⓑ, or Ⓒ and Ⓓ (see Fig. 5-1) on the cabinet just under the side panel, and push the side panel forward.

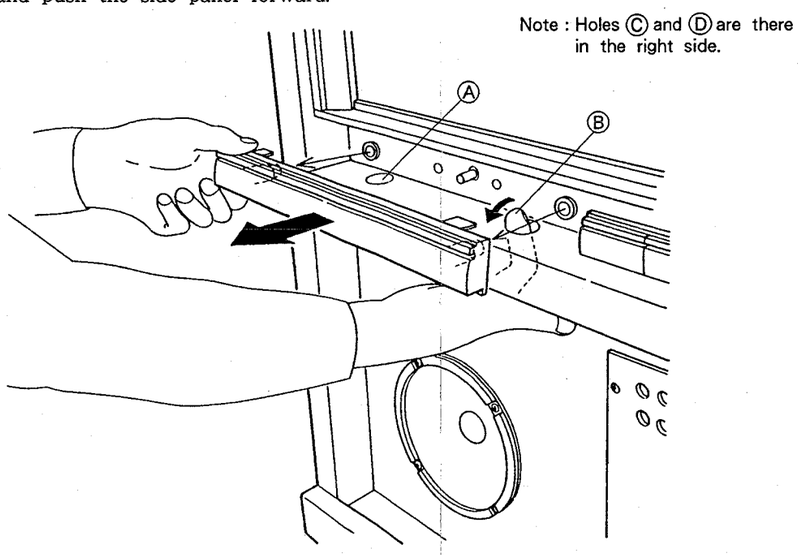
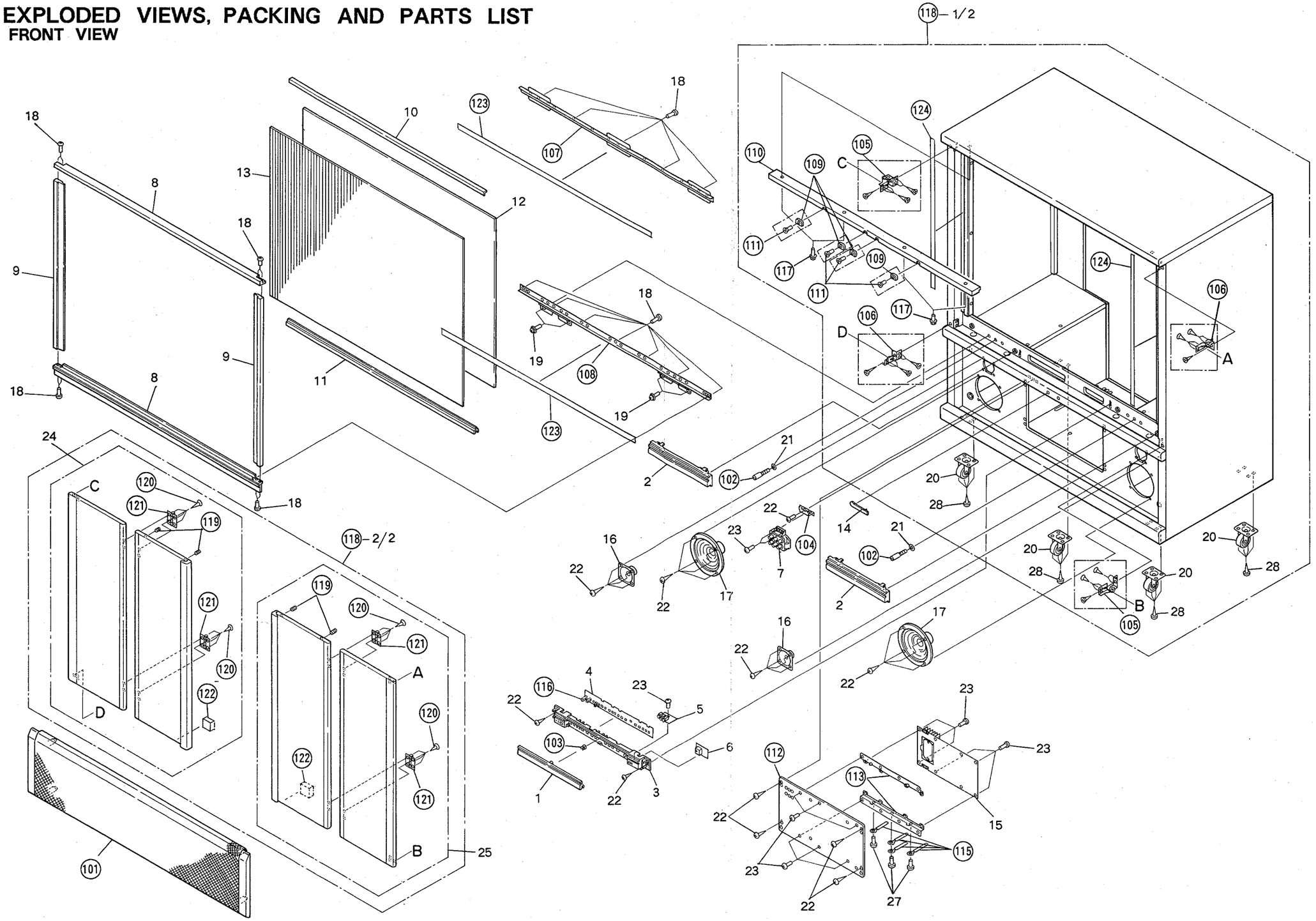


Fig. 5-1 Removal of the side panel assembly (Left side view)

6. EXPLODED VIEWS, PACKING AND PARTS LIST

6.1 FRONT VIEW



NOTES :
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- Parts marked by ☆ are important parts which use X – rays.
  If any of these parts need to be replaced, always replace with specified parts.
- Parts having the (T) mark are for the KUX1C type manufactured by Harvey Manufacturing, Inc., and parts having the (L) mark are for the KUX1C type manufactured by PIONEER ELECTRONICS TECHNOLOGY, INC.

Parts List

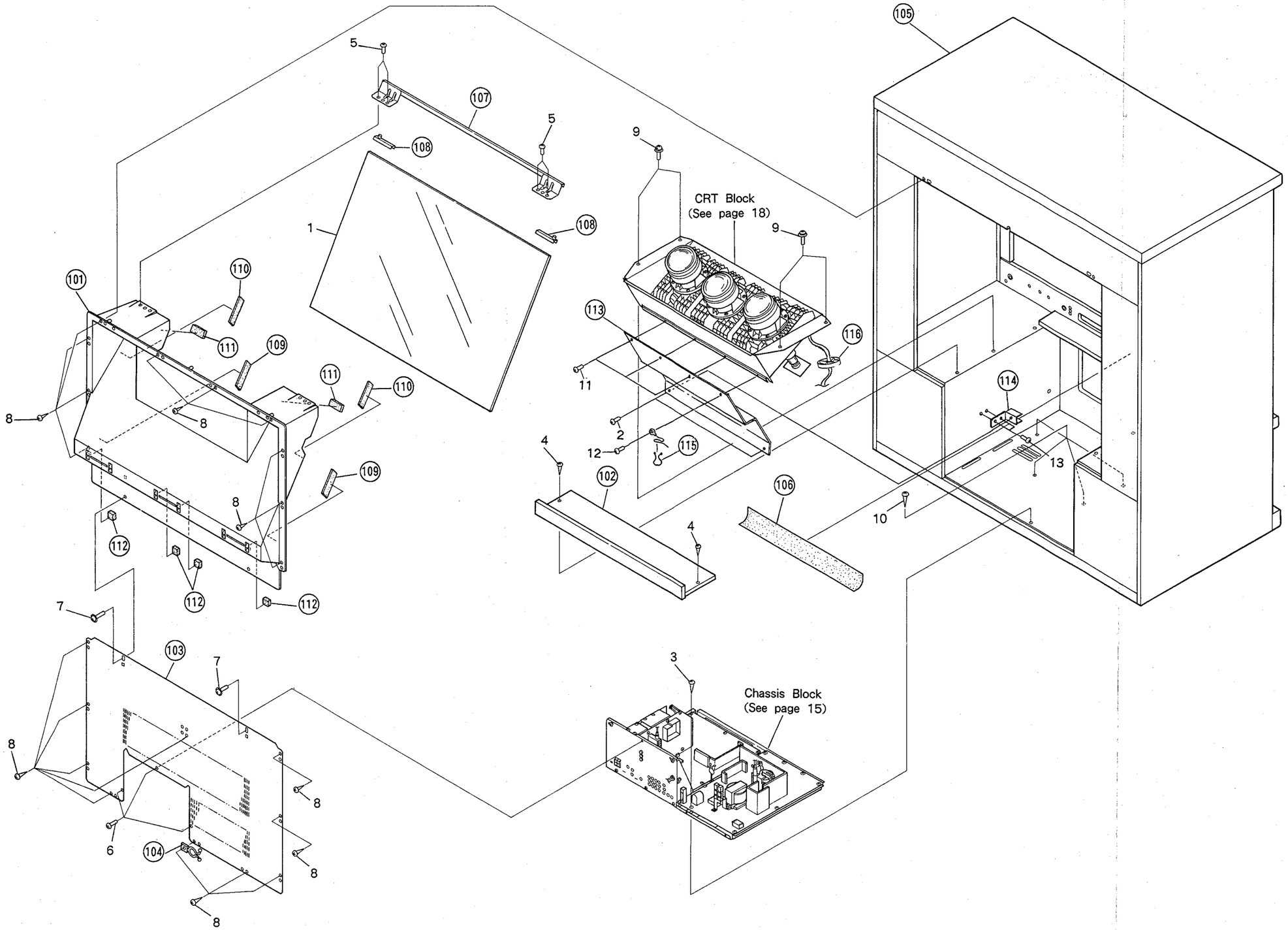
Mark	No.	Part No.	Description
	1	AAN1136	Door assembly
	2	AMB1497	Side panel assembly
	3	AMB1510	Front panel assembly
	4	AWZ2539	FRONT CONTROL assembly
	5	AWZ2542	FRONT INPUT TERMINAL assembly
	6	AWZ2541	RECEIVER assembly
⚠	7	ACX1025	Focus variable resistor (VR1)
	8	AAP1085	Screen frame H
	9	AAP1087	Screen frame V
	10	AAP1063	Spacer H
	11	AAP1069	Spacer L
	12	AMR1703	Fresnel lens
	13	AMR1706	Lenticular sheet
	14	AAM1008	Badge
	15	AWZ2537	CONVERGENCE assembly
	16	APT1004	Speaker (tweeter)
	17	APV1013	Speaker
	18	BYC40P200FMC	Screw
	19	ABA1067	Screw
(T)	20	AMR1256	Caster
(L)	20	AMR1652	Caster
	21	WA42F120K080	Washer
	22	BYC35P160FZK	Screw
	23	BBZ30P080FZK	Screw
	24	AMR1799	Door L
	25	AMR1800	Door R
	26		• • • • •
	27	VCZ30P060FMC	Screw
(T)	28	ABA1040	Screw
(L)	28		Screw

Mark	No.	Part No.	Description
	101		Grille-QD
	102		Guide pin
	103		Catcher
	104		VR holder
	105		Hinge A
	106		Hinge B
	107		Holder assembly
	108		Holder assembly
	109		Catch plate
	110		Top frt filler
	111		Flat head wood screw 3.1 × 16
	112		Blind plate
	113		Stay
	114		• • • • •
	115		Binder
	116		LED holder
	117		Screw
	118		Cabinet
	119		Magnet catch
	120		Screw
	121		Butterfly hinge
	122		Cushion
	123		Spacer (SD-P453P-Q, SD-P453P-W, SD-P453S-Q, SD-P453FP-Q, and PRO-72 types only.)
	124		Cushion (SD-P453P-Q, SD-P453P-W, SD-P453S-Q, SD-P453FP-Q, and PRO-72 types only.)

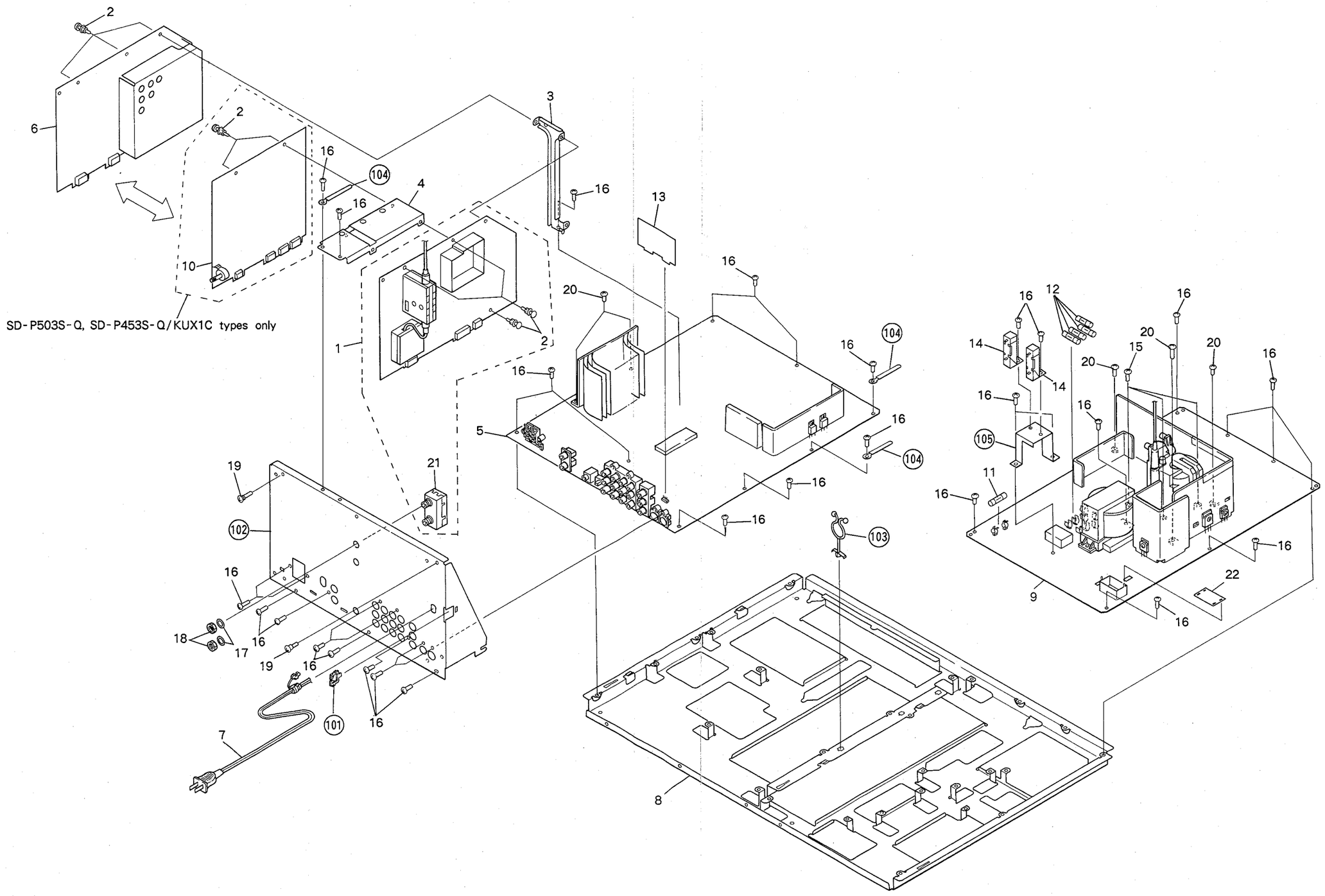
6.2 REAR VIEW

Mark	No.	Part No.	Description
	1	AMR1521	Mirror
	2	ABA1085	Screw
	3	BYC35P160FZK	Screw
	4	ABA1079	Screw
	5	ABA1069	Screw
	6	BBZ30P080FZK	Screw
	7	ABA1005	Screw
	8	ABA1040	Screw
	9	PMB50P250FZB	Screw
	10	ABA1038	Screw
	11	BBZ30P080FZK	Screw
	12	VBT30P080FZK	Screw
	13	BYC35P120FZK	Screw

Mark	No.	Part No.	Description
	101		Mirror case
	102		Shield plate
	103		Rear cover
	104		Cable clip
	105		Cabinet
	106		Sheet
	107		Mirror holder assembly
	108		Rubber cushion
	109		Rubber cushion
	110		Cushion sheet C
	111		Cushion sheet B
	112		Cushion sheet A
	113		Shield plate
	114		Holder
	115		Purse lock S
	116		Anode clamper


CRT Block
(See page 18)
Chassis Block
(See page 15)

6.3 CHASSIS BLOCK



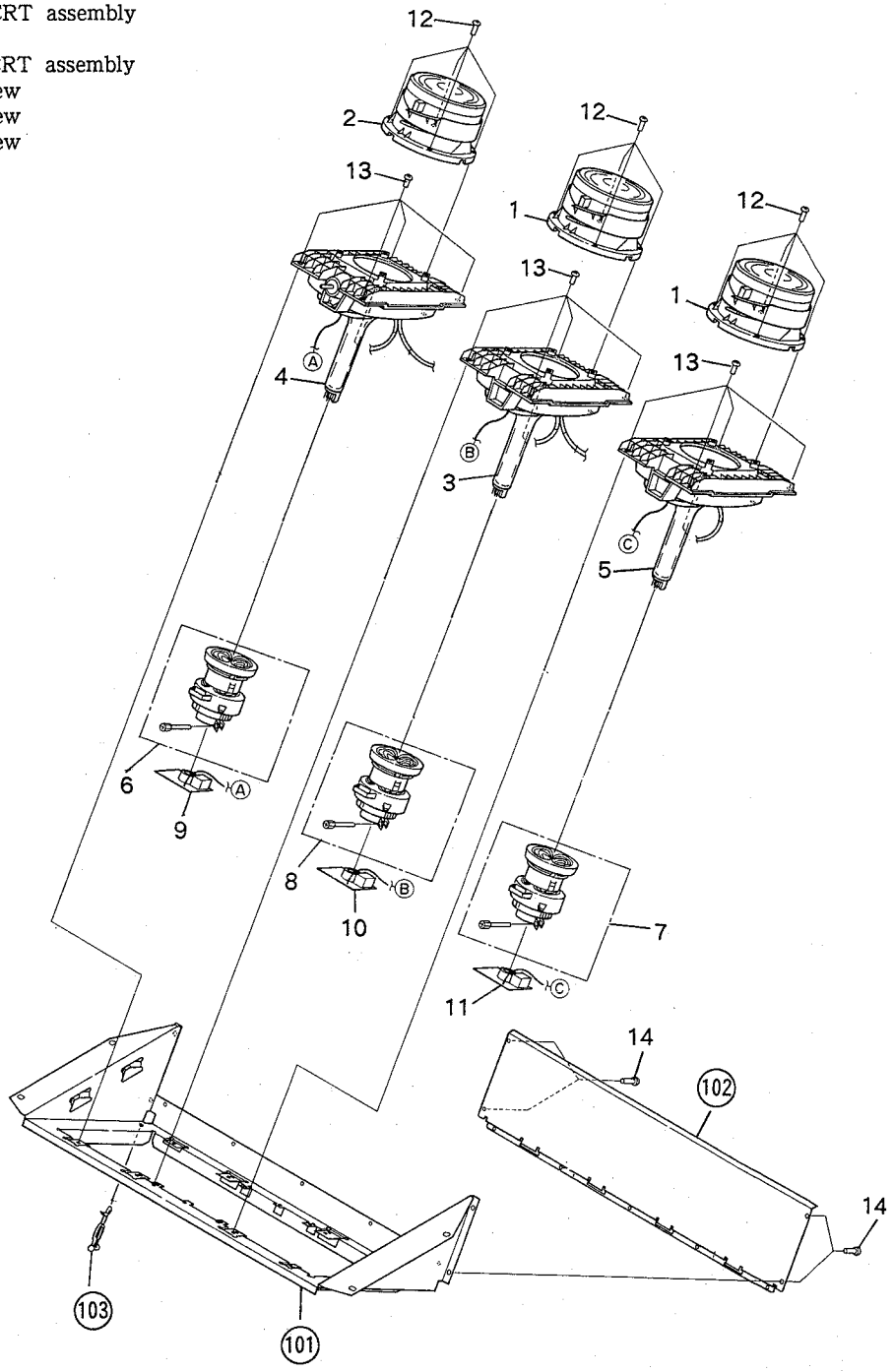
Mark	No.	Part No.	Description
	1	AWE1135	TUNER assembly
	2	AEC-441	Rivet
	3	ANG1405	P. C. B angle
	4	ANG1373	P. C. B holder
	5	AWV1076	VIDEO/AUDIO assembly
	6	AWV1086	PINP assembly
⚠	7	ADG1056	AC power cord
	8	ANA1095	Chassis
☆	9	AWV1079	DEFLECTION assembly
	10	AWV1085	SURROUND assembly (SD-P503S-Q, SD-P453S -Q/KUX1C types only)
⚠	11	AEK1002	Fuse (8A, FU651)
⚠	12	AEK1018	Fuse (4A, FU652,FU655, FU656,FU658)
	13	AWZ2538	PINP SELECT assembly
⚠	14	ACN1058	Wire wound resistor (R1,R2)
	15	VBZ30P200FMC	Screw
	16	BBZ30P080FZK	Screw
	17	WAX0F160N100	Washer
	18	ABN-087	Nut
	19	ABA1089	Screw
	20	ABA1088	Screw
	21	AXF1034	RF switch
	22	ANH1213	Shield cover

Mark	No.	Part No.	Description
	101		Cord holder
	102		Rear panel
	103		Cable clip
	104		Binder
	105		Holder

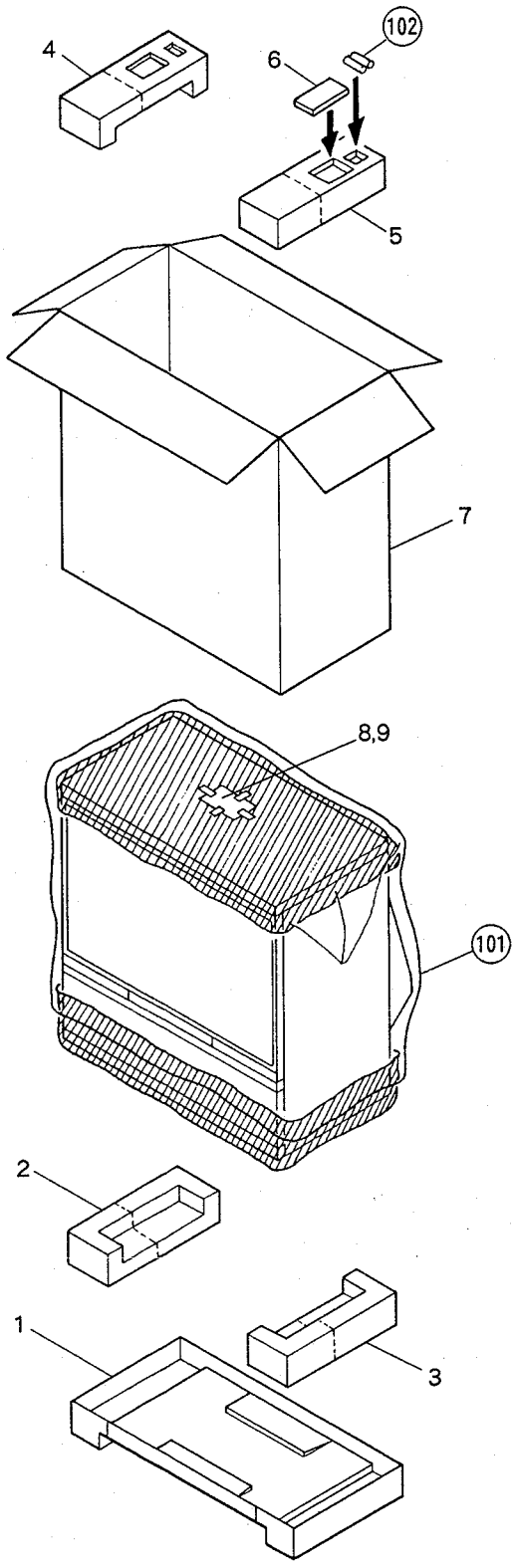
6.4 CRT BLOCK

Mark	No.	Part No.	Description
☆	1	AWL1020	Lens assembly 50 (GB)
☆	2	AWL1021	Lens assembly 50 (R)
☆⚠	3	AWY1057	CRT assembly G
☆⚠	4	AWY1058	CRT assembly R
☆⚠	5	AWY1059	CRT assembly B
⚠	6	ATL1054	Deflection yoke (R) (L1)
⚠	7	ATL1055	Deflection yoke (B) (L3)
⚠	8	ATL1056	Deflection yoke (G) (L2)
	9	AWZ2530	R. CRT assembly
	10	AWZ2531	G. CRT assembly
	11	AWZ2532	B. CRT assembly
	12	AMZ40P080FZK	Screw
	13	FBT40P120FZK	Screw
	14	BBZ30P080FZK	Screw

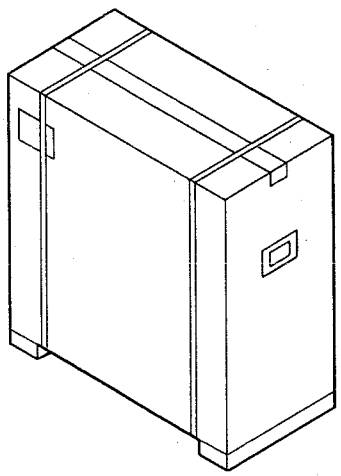
Mark	No.	Part No.	Description
	101		CRT stand
	102		Cover L
	103		Lead clamper



6.5 PACKING



Mark	No.	Part No.	Description
	1	AHD1665	Under carton
	2	AHA1172	Under pad L
	3	AHA1173	Under pad R
	4	AHA1174	Upper pad L
	5	AHA1175	Upper pad R
	6	AXD1106	Remote control unit
	7	AHD1664	Upper carton
	8	ARB1187	Operating instructions (English)
	9	ARB1188	Operating instructions (English)
	101		Packing bag
	102		Battery



7. ELECTRICAL PARTS LIST

NOTES :

- Parts without part number cannot be supplied.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560 Ω → 56 × 10^1 → 561 ····· RD1/4PS 5 6 1 J
47k Ω → 47 × 10^3 → 473 ····· RD1/4PS 4 7 3 J
0.5 Ω → 0R5 ····· RN2H 0 R 5 K
1 Ω → 010 ····· RS1P 0 1 0 K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k Ω → 562 × 10^1 → 5621 ····· RN1/4SR 5 6 2 1 F

- Parts marked by ☆ are important parts which use X-rays. If any of these parts need to be replaced, always replace with specified parts.
- Parts marked by × are important parts which use X-rays. If a failure occurs in any of these parts, replace the printed circuit board assembly where the relevant part has already been adjusted as a working component. Do not replace the actual part itself. If any part marked by × is replaced, there is danger of being exposed to X-rays.

Miscellaneous Parts

P. C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
	PINP SELECT assembly	AWZ2538
	RECEIVER assembly	AWZ2541
	VIDEO/AUDIO assembly	AWV1076
	FRONT INPUT TERMINAL assembly	AWZ2542
☆	DEFLECTION assembly	AWV1079
	TUNER assembly	AWE1135
	PINP assembly	AWV1086
	CONVERGENCE assembly	AWZ2537
	R CRT assembly	AWZ2530
	G CRT assembly	AWZ2531
	B CRT assembly	AWZ2532
	FRONT CONTROL assembly	AWZ2539

OTHERS

Mark	Symbol & Description	Part No.
⚠	R1,R2 Wire-wound resistor (0.47Ω/20W)	ACN1058
⚠	VR1 Focus variable resistor	ACX1025
⚠	L1 Deflection yoke (R)	ATL1054
⚠	L2 Deflection yoke (G)	ATL1056
⚠	L3 Deflection yoke (B)	ATL1055
⚠	FU651 Fuse (8A/125V)	AEK1002
⚠	FU652,FU655,FU656,FU658 Fuse (4A/125V)	AEK1018
	Speaker (High range)	APT1004
	Speaker (Mid- Low range)	APV1013
⚠	AC power cord	ADG1056
⚠	J1 Anode cable	ADY1011
⚠☆	CRT assembly G	AWY1057
⚠☆	CRT assembly R	AWY1058
⚠☆	CRT assembly B	AWY1059
	Remote control unit	AXD1106

PINP SELECT Assembly (AWZ2538)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC901,IC902	NJM2235S
	Q901	2SA933S
	D901 – D908,D911,D912	1SS252

CAPACITORS

Mark	Symbol & Description	Part No.
	C983	CEAS101M25
	C975	CEJA010M50
	C971 – C974,C976	CEJA100M16
	C981,C982	CKDYF103Z50

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/8PM□□□J

RECEIVER Assembly (AWZ2541)

CAPACITORS

Mark	Symbol & Description	Part No.
	C962	CCDSL121J50
	C961	CEJA101M6

RESISTOR

Mark	Symbol & Description	Part No.
	R551	RD1/8PM102J

OTHERS

Mark	Symbol & Description	Part No.
	Remote control sensor unit	AXX1010

VIDEO/AUDIO Assembly (AWV1076)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	TH601	TH101-2
	IC401	PA0040
	IC103	AN5302K
	IC102	PA0030
	IC101	TC4066BP
	IC206	UPC78M05H
	IC205	M6M80011AP
	IC203	PDG040
	IC201,IC202	TC4051BP
	IC204	UPD6145C-001
	IC601	NJM78M09A
	IC451	TA7630P
	IC452	TA8200AH
	Q248,Q408,Q412 – Q414	RN1203
	Q411	RN2203
	Q102 – Q104,Q109,Q110,Q116, Q117,Q128,Q129,Q132,Q134, Q137 – Q141,Q145,Q147,Q148, Q150,Q154,Q156,Q157,Q162,Q167, Q168,Q171,Q172,Q201,Q203,Q204, Q206,Q207,Q209,Q211,Q213,Q215, Q217,Q219,Q222,Q225,Q226,Q228, Q230,Q242,Q246,Q247,Q401,Q407, Q409,Q415,Q455,Q604,Q609	2SA933S
	Q105 – Q108,Q113 – Q115, Q118 – Q122,Q127,Q133,Q135, Q136,Q144,Q146,Q149,Q152,Q160, Q161,Q163 – Q165,Q202,Q205, Q208,Q210,Q212,Q214,Q216,Q218, Q220,Q221,Q223,Q224,Q227,Q229, Q231 – Q241,Q243,Q245,Q405, Q406,Q410,Q451,Q452,Q456, Q605 – Q608	2SC1740S
	Q453,Q454,Q457,Q458	2SC3327
	Q125,Q126,Q130,Q131,Q142,Q143, Q166	2SK246
	Q244	2SD438
	Q601	2SB950A
	Q603	2SC1845
	Q602	2SD1276A
	D112,D220	RD5.1ESB1
	D905	HZS5BLL
	D451 – D454	RD6.8ESB2
	D106	1SS108
	D101 – D103,D109 – D111,D115, D116,D125 – D133,D201 – D213, D215,D216,D219,D221 – D224, D227 – D234,D455 – D462, D601 – D608,D610,D611,D613, D614,D901 – D903	1SS252
	D107,D108,D113,D114,D121,D122	OA90A-M
	D463	11E2

SWITCH

Mark	Symbol & Description	Part No.
	S451 Slide switch (SPEAKER SELECTOR)	ASH1001

COILS

Mark	Symbol & Description	Part No.
	L150 Tuning coil	ATG1006
	L105,L106	LAU1R8M
	L114,L201,L203	LAU100K
	L101,L108,L110,L151	LAU150K
	L103,L104	LAU3R9K
	L111,L112,L115	LAU4R7K
	L107	LAU680K
	L109	LAU820K
	L202	LAU470K
	L451,L452 AF choke coil (1μH)	ATH-133

CAPACITORS

Mark	Symbol & Description	Part No.
	TC201 Ceramic trimmer (5.2 – 30p)	ACM-017
	C695 (0.82μ/50V)	ACH-388
	C681 (2.2μ/16V)	ACH1131
	C521,C522 (3.3μ/63V)	ACH1127
	C143	CCCCH100D50
	C244	CCCCH330J50
	C692	CCDCH221J50
	C110	CCCSL100D50
	C159,C178,C239,C685,C700,C791	CCCSL101J50
	C112,C149	CCCSL121J50
	C121,C122	CCCSL271J50
	C102	CCCSL150J50
	C131,C146,C163,C175,C183	CCCSL151J50
	C190	CCCSL220J50
	C179	CCCSL221J50
	C111,C132,C795	CCCSL390J50
	C267	CCDSL270J50
	C144,C161,C172,C185	CCCSL470J50
	C114,C240	CCCSL680J50
	C241	CCDSL560J50
	C797	CCDSL181J50
	C145,C162,C173,C683	CEANP010M50
	C168	CEANP100M16
	C167	CEANP3R3M50
	C479	CEANPR22M50
	C268,C697	CEANP2R2M50
	C793	CEANP4R7M35
	C455	CEANP220M10
	C141	CEASR47M50
	C106,C138,C156 – C158,C166, C258,C459 – C468,C480,C517, C518,C523,C532,C699	CEAS010M50
	C101,C104,C108,C135,C139,C152, C164,C165,C169,C174,C215,C217, C245,C247,C253,C266,C477,C696, C794	CEAS100M50

Mark	Symbol & Description	Part No.
	C126,C488	CEAS101M16
	C170	CEAS220M16
	C147,C186	CEAS221M16
	C151,C153	CEAS3R3M50
	C109,C123,C124,C176,C481	CEAS330M16
	C103	CEAS4R7M50
	C113,C127 – C129,C133,C698	CEAS470M16
	C171	CKCYB331K50
	C107,C118,C119	CKCYB391K50
	C160	CKCYB561K50
	C130	CKCYF102Z50
	C116,C117,C120,C125,C134,C155	CKDYF103Z50
	C140,C142,C154	CKCYX473M25
	C230,C684	CEASR33M50
	C211	CEAS0R1M50
	C249,C250,C673	CEAS101M10
	C221,C226,C233,C265,C507,C508	CEAS330M25
	C238	CEAS470M25
	C242,C689	CEAS471M10
	C213,C216,C219,C220, C222 – C225,C228,C229,C231, C232	CEJA2R2M50
	C214,C263,C264	CKCYB102K50
	C234	CKCYB472K50
	C218,C227,C235,C243,C246,C248, C252,C261,C458,C472,C474,C478, C483 – C485,C487,C525,C680, C800	CKDYF103Z50
	C212,C236,C237,C251,C262,C511, C526,C533,C674 – C677,C688, C690	CKDYF473Z50
	C456	CEAS102M10
	C469,C470,C505,C506,C687	CEAS2R2M50
	C482	CEJA100M16
	C486,C502	CEAS222M16
	C451 – C454,C471,C473	CEJA220M10
	C515,C516	CEAS222M35
	C497 – C501,C524	CEAS470M10
	C509,C510	CEAS470M50
	C512	CEAS471M50
	C495,C496,C513,C514	CFTXA124J50
	C491,C492	CFTXA154J50
	C493,C494	CKCYB562K50
	C503,C504	CKMYB561K50
	C672	CEAS102M16
	C693,C694	CEAS222M25
	C671	CEHAQ471M50
	C792	CKCYB561K50
	C682	CQMA123J50
	C678	CQMA182J50
	C691	CQMA223J50
	C686	CQMA333J50
	C798	CQMA473J50
	C679	CQMA683J50
	C530,C531	CEHAQ2R2M50
	C799	CEAS220M50

RESISTORS

Mark	Symbol & Description	Part No.
	VR102 Semi-fixed (220Ω)	ACP1021
	VR101 Semi-fixed (1kΩ)	ACP1022
	VR107 Semi-fixed (2.2kΩ)	ACP1023
	VR105,VR601 Semi-fixed (100Ω)	ACP1031
	R242,R271,R312,R438,R673,R674	RD1/2PM□□□J
⚠	R514,R696,R697	RD1/4PMFL100J
	R617 Resistor array	RA4T103J
⚠	R614	RS2LMF220J
	R417,R418	RS1LMF010J
	R401,R402,R423	RS2LMF□□□J
⚠	R951,R952	RD1/4PMFL2R2J
⚠	R694,R695	RD1/4PMFL220J
	R949,R950	RD1/4PMFL□□□J
	Other resistors	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X101 Crystal resonator (3.579545MHz)	ASS-028
	DL101 Glass delay line	ATN1011
	DL102,DL104 Delay line	ATN1013
	DL103 Delay line	ATN1014
	X201 Ceramic resonator (4.19MHz)	ASS1022
	X601 Ceramic resonator	ASS1033
	12P Pin jack	AKB1094
	4P Mini DIN socket	AKP1016
	Mini jack	AKN-207
	2P Pin jack	AKB1039
	4P Terminal (SPEAKER)	AKE1014

FRONT INPUT TERMINAL Assembly (AWZ2542)

RESISTORS

Mark	Symbol & Description	Part No.
	R541 – R543	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	1P Pin jack	AKB-104
	1P Pin jack	AKB-105
	1P Pin jack	AKB-106

☆DEFLECTION Assembly (AWV1079)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC651	ON3161-Q
	IC551	NJM4558DXP
⚠	IC552	NJM4558DXP
×	Q592	
	Q554,Q589,Q656 – Q660,Q664, Q665	2SA933S
×	Q590	
×	Q586,Q587	
	Q597	2SA965
	Q551 – Q553,Q555,Q556,Q599, Q600,Q653 – Q655,Q661,Q667	2SC1740S
	Q598	2SC2235
	Q557,Q596,Q662	2SC2705
×	Q591,Q593	
	Q559,Q588	2SC3332
	Q558,Q595	2SD1276A
⚠	Q594	2SD1911
	Q560	2SD1911
	Q652	2SB824
	Q651	2SC3451
	Q663,Q666	2SD1275
	D573	ES1F
⚠	D598,D599	ES1F
	D557	HZS6C1L
×	D580,D582	
	D578	RD39ESB
×	D584	
×	D592	
×	D597	
	D589,D590	UZ-15BS
	D672	HZS18-1L
	D668	HZS6A1L
	D662,D663,D671,D673	HZS6B1L
	D665	HZS6C2L
	D651	RB604
	D680	RD39ESB4
	D679	RG4A
	D667	RL2Z
	D666,D674 – D678	RL4Z
	D660	S1YB10
×	D581,D583	
	D551,D553 – D556,D574 – D577, D579,D585 – D588,D591, D593 – D596,D655 – D658,D661, D664,D681 – D686	1SS252
	D552	11E2
⚠	D558	11E2
	D653,D654,D659	11DF1FD
⚠	D600	11DF2FD

RELAY

Mark	Symbol & Description	Part No.
	RY651 Relay	ASR-512

COILS AND TRANSFORMERS

Mark	Symbol & Description	Part No.
	L551 FBT coil	ATL1053
	L552 FBT coil	ATL1057
	L553 Linearity coil	ATL1058
	L654,L656,L658 – L671 Ferrite bead	ATX-028
	L652 Line filter	ATF-207
	L651 Line filter	ATF1031
	L655 AF choke coil (1μH)	ATH-133
	L653 AF choke coil (53μH)	ATH1009
	L556	LTA272J
⚠×	T553 Flyback transformer	
⚠	T551,T552 Horiz. drive transformer	ATK1045
	T652 Converter transformer	ATK1044
	T651 Power transformer	ATT1099

CAPACITORS

Mark	Symbol & Description	Part No.
	C625 (0.82μ/200V)	ACE1044
	C620 (680p/2kV)	ACG1024
⚠	C666 (680p/2kV)	ACG1024
	C670 (10μ/160V)	ACH-369
⚠	C619 (1μ/160V)	ACH-372
⚠	C668 (10μ/160V)	ACH1117
	C616 (330μ/200V)	ACH1079
	C701,C702 (0.1μ/AC250V)	ACE-507
	C722 – C725 (6800p/AC250V)	ACE1009
	C703 – C706 (0.01μ/AC250V)	ACG-001
	C714 (2200p/2kV)	ACG-039
	C760 (100p/2kV)	ACG-032
	C712 (4700p/2kV)	ACG1028
	C715 (2.2μ/350V)	ACH-371
	C759 (560μ/160V)	ACH1016
	C747 (3300μ/50V)	ACH1041
	C707 (560μ/200V)	ACH1042
	C709 (1000μ/200V)	ACH1050
	C717 (47μ/100V)	ACH1132
	C657,C669	CCCSL101J50
	C624	CCCSL181J50
	C708	CCCSL151J50
	C718,C720,C749 – C752,C755, C756,C758	CCDSL221K500
	C645	CEAS0R1M50
	C608 – C610,C640,C643,C647, C648,C655,C656,C659,C733,C744, C763	CEAS010M50
	C607,C612,C741,C743,C745,C765	CEAS100M50
	C653,C654	CEAS101M35
	C665	CEAS220M100
	C641	CEAS221M35
	C642,C646	CEAS470M16
	C732,C764	CEAS101M16
	C726	CEAS102M25

Mark	Symbol & Description	Part No.
	C746	CEAS221M16
	C739	CEAS331M35
	C729 – C731	CEAS470M25
	C617,C663	CEHAQ010M50
	C664	CEHAQ100M50
	C660	CEHAQ220M25
	C737	CEHAQ102M16
	C754	CEHAQ102M50
	C735,C748,C753	CEHAQ222M35
	C757	CEHAQ222M50
	C623	CFPA103H1200
	C622,C667	CFPA123H1200
	C716	CFTXA224J50
	C721	CFTXA474J50
	C644	CKCYB102K50
	C615,C618	CKCYB102K500
	C742	CKCYB681K50
	C639,C649 – C652,C727,C728, C734	CKCYF103Z50
	C736,C738	CKCYF473Z50
	C740,C766	CKCYX473M25
	C611	CKDYB222K50
	C662	CKDYB472K500
	C601,C603,C613	CKDYF473Z50
	C761,C762	CKDYF103Z500
	C602	CKDYX104M25
	C605	CQMA103K400
	C604	CQMA123K50
	C658	CQMA104K50
	C606	CQMA223K50
	C661	CQMA683K400
	C719	CQMA822J50
	C621	CQPA683J400

RESISTORS

Mark	Symbol & Description	Part No.
×	VR553 Semi-fixed	
×	VR555 Semi-fixed	
×	VR554 Semi-fixed	
×	VR552 Semi-fixed	
	VR651 Semi-fixed (1kΩ)	VRTS6VS102
	VR551 Semi-fixed (2.2kΩ)	ACP1023
	R180 Solid (47/1/2W)	ACN-225
⚠	R143 Solid (33k/1/2W)	ACN1011
	R251,R279 Solid (2.2M/1/2W)	ACN-208
	R252,R264 (2.7Ω/5W)	ACN1060
	R254 Wire-wound (15/10W)	ACN1056
	R256,R257 Wire-wound (18/10W)	ACN1057
⚠	R139	RD1/2PMFL102J
	R108	RD1/2PMFL100J
	R133,R134,R141,R185,R224,R225, R228,R255,R261,R263,R313,R318	RD1/2PM□□□J
⚠	R142	RD1/2PMFL3R9J
⚠	R183,R238	RD1/4PMFL100J
⚠	R186,R187	RD1/4PMFL390J

Mark	Symbol & Description	Part No.
	R184,R243,R258	RD1/4PMFL□□□J
	R244	RD1/4PM124J
	R229,R230	RN1/2PC□□□□F
	R291,R295 – R297,R310,R311	RN1/4PC□□□□F
	R199,R200,R253,R312	RS1LMF□□□J
	R241,R259,R288,R293,R317	RS2LMF□□□J
	R246,R265,R316	RS3LMF□□□J
	R247	RFA1/4PS221J
	R140,R144,R231	RS2PMF□□□J
⚠×	R234	
×	R232	
×	R233	
×	R240	
×	R226	
×	R213	
×	R188,R196,R197,R211	
×	R210	
×	R209	
×	R208	
×	R239	
×	R194	
×	R195	
×	R198	
×	R203	
×	R204	
×	R205	
×	R206	
	Other resistors	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	Mica sheet (FOR Q651)	AEP-056

TUNER Assembly (AWE1135)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC304	CXA1124AS
	IC301	M51365SP
	IC302	M5223P
	IC305	NJM78M09A
	IC303	TD6359P
	Q321	RN1201
	Q320	RN1203
	Q319	RN2203
	Q301 – Q304,Q307,Q312,Q315, Q325	2SA933S
	Q308 – Q311,Q313,Q314,Q318, Q322 – Q324,Q326,Q327	2SC1740S
	Q317	2SC1740SLN
	Q305,Q306	2SC2786
	Q316	2SC2878
	D304	RD30ESB2
	D301,D302,D305 – D309	1SS252

COILS AND FILTERS

Mark	Symbol & Description	Part No.
	L302,L303,L309 Tuning coil	ATC-226
	L310 Tuning coil	ATC-249
	L306 Tuning coil	ATC-254
	L312 FM detector coil	ATE-067
	L301	LAUR33M
	L304	LAUR47M
	L305	LAU1R2M
	L308	LAU150K
	L311,L313 – L316	LAU2R2M
	F303 Ceramic trap	ATF-114
	F304 Ceramic filter	ATF-166
	F301 SAW filter	ATF1019
	F302 SAW filter	ATF1046

CAPACITORS

Mark	Symbol & Description	Part No.
	C402 (3.3μ/50V)	ACH1128
	C400 (10μ/50V)	ACH1129
	C350	CCDRH270J50
	C334,C348	CCDRH560J50
	C338	CCDSH470J50
	C347	CCDSL820J50
	C337,C339	CCMCH040C50
	C335,C336,C354	CCMCH050C50
	C417	CCMCH150J50
	C385,C386	CCMCH270J50
	C379,C381 – C384	CCMSL101J50
	C396	CEANPR22M50
	C361,C407	CEASR47M50
	C353,C401	CEAS010M50
	C364	CEAS100M50
	C376,C377,C388,C422	CEAS101M10
	C341	CEAS101M16
	C331	CEAS102M16
	C345,C349,C408,C409	CEAS2R2M50
	C375,C415	CEAS331M16
	C342,C392,C395,C399,C403,C404, C406,C412	CEAS4R7M50
	C351,C366,C373,C397,C414	CEAS470M16
	C405	CFTXA473J50
	C413,C416	CKCYX104M25
	C367,C374	CKCYX473M25
	C333,C340,C343,C362,C365,C368, C370,C371,C378,C380,C419	CKDYB102K50
	C346	CKDYB122K50
	C332,C352,C355,C356,C359,C360, C363,C372,C387,C391,C418,C420, C421	CKDYF103Z50
	C344	CQMA103J50
	C357,C358	CQMA104J50
	C394	CQMA123J50
	C389	CQMA154J50
	C410,C411	CQMA222J50
	C398	CQMA272J50
	C390	CQMA333J50
	C393	CQMA562K50
	C369	CQMA563J50

RESISTORS

Mark	Symbol & Description	Part No.
	VR301,VR302,VR306 Semi-fixed (4.7kΩ)	ACP1024
	VR305 Semi-fixed (10kΩ)	ACP1025
	VR303,VR304 Semi-fixed (47kΩ)	ACP1027
	R1242,R1244	RD1/2PMFL□□□J
	R1245	RD1/4PMFL8R2J
	R1243	RD1/4PM221J
	R1213,R1217,R1218,R1220,R1221	RN1/4PC□□□□F
	Other resistors	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X301 Crystal resonator (4.0MHz)	ASS-013
	TV Front end	AXF1033
	RF switch	AXF1034
	Coaxial cable with pin plug	ADE1070
	3P Connector	KPC3

PINP Assembly (AWV1086)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	TH501,TH502	TH102-2
	IC502	HA11525NT
	IC503	HA11532NT
	IC506	HA11544
	IC510	HA118088NT
	IC507	HA19216
	IC504	HA19507NT
	IC505	HA19508A
	IC501	HD49728
	IC508	HM53461P-12
	IC513	TC74HC74AP
	IC509,IC512	TC74HC132AP
	IC511	UPC78M05H
	Q502 – Q504	2SA933S
	Q501,Q511,Q512,Q521 – Q528 Q531	2SC1740S
	D501 – D507,D511 – D513	1SS252

COILS AND FILTER

Mark	Symbol & Description	Part No.
	F501 EMI filter	ATF1011
	L521 – L523,L526	LAU100K
	L504	LAU101K
	L534	LAU121K
	L503	LAU181K
	L524,L530,L532,L535	LAU220K
	L511 – L514	LAU221K
	L515	LAU330K
	L525	LAU390K
	L527	LAU470K
	L516	LAU5R6K
	L502	LAU560K
	L501,L533	LAU680K
	L528,L529,L531	LAU820K

CAPACITORS

Mark	Symbol & Description	Part No.
	C553	CCDCH121J50
	C555	CCDCH820J50
	C292,C299,C317	CCCSL100D50
	C289,C300,C561,C563	CCCSL101J50
	C281,C301	CCCSL150J50
	C296	CCCSL180J50
	C318	CCCSL181J50
	C290	CCCSL220J50
	C319	CCCSL271J50
	C288,C308	CCCSL330J50
	C309,C559	CCCSL390J50
	C533	CCCSL470J50
	C320	CCCSL820J50
	C294	CEASR22M50
	C313	CEAS0R1M50
	C316,C325,C541,C545,C546,C562, C564,C590	CEAS010M50
	C283,C303,C324	CEAS100M50
	C576,C588,C595	CEAS101M10
	C575	CEAS101M16
	C285,C298,C305,C326 – C328	CEAS2R2M50
	C549,C578,C579,C583,C584,C591, C594	CEAS221M10
	C323,C571	CEAS221M16
	C321	CEAS331M10
	C293,C311	CEAS4R7M50
	C322,C598	CEAS470M25
	C574	CEAS471M10
	C284,C304	CKCYB102K50
	C531,C536	CKCYB152K50
	C554	CKDYB272K50
	C310,C551	CKCYB331K50
	C312	CKCYB332K50
	C543,C544	CKCYB471K50
	C552	CKDYB681K50
	C291,C295,C314,C535, C556 – C558,C565,C566,C577, C580,C581,C582,C585 – C587, C596,C597	CKCYF103Z50
	C548	CKCYF223Z50
	C592	CKCYF473Z50
	C542,C547,C572,C573,C589	CKCYX104M25
	C593	CKDYX104M25
	C287,C307	CQMA152J50
	C315	CQMA223J50
	C534	CQMA102J50
	C286,C306	CQMA103J50
	C282,C302,C532,C537	CQMA332J50
	C297	CQMA333J50
	C567	CEJA470M10

RESISTORS

Mark	Symbol & Description	Part No.
	VR502 Semi-fixed (2.2kΩ)	VRTS6VS222
	VR501 Semi-fixed (22kΩ)	VRTS6HS223
	VR511 Semi-fixed (4.7kΩ)	VRTS6HS472
	VR512,VR521,VR522 Semi-fixed (220Ω)	VRTS6VS221
⚠	R1441	RD1/2PMFL1R5J
⚠	R1442	RD1/4PMFL100J
	Other resistors	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X502,X504 Crystal resonator (3.579545MHz)	ASS-028
	X501,X503 Ceramic resonator	ASS1032

CONVERGENCE Assembly (AWZ2537)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC704 – IC706	M5220L
	IC703	NJM79L15A
	IC701	PA0036
	IC751	STK4277-SL
	IC702	UPC78L12J
	Q751	2SB951A
	Q701 – Q705,Q755	2SC1740S
	Q753,Q754	2SC2235
	Q752	2SD1277A
	D705,D708	RD5.1ESB
	D701	RD8.2ESB
	D702 – D704,D706,D707	1SS252
	D751,D752	11E2

CAPACITORS

Mark	Symbol & Description	Part No.
	C829,C830,C835,C836,C841,C842 C845,C846,C851,C852	CCMSL470J50
	C822	CEANP010M50
	C801,C804	CEASR33M50
	C802,C805,C807	CEAS010M50
	C810,C823 – C826	CEAS100M50
	C855	CEAS101M16
	C856	CEAS101M25
	C813,C815	CEAS102M6
	C819,C821	CEAS2R2M50
	C827,C828,C833,C834,C839,C840, C843,C844,C849,C850	CEAS221M10
	C886,C888 – C890	CEHAQ101M50
	C882,C884	CEHAQ221M35
	C891	CEHAQ330M50
	C803,C806,C812,C814,C831,C832, C837,C838,C847,C848	CGMYX103M16
	C881,C883,C885,C887	CKCYF103Z50
	C809	CQMA154J50
	C811,C816	CQMA224J50
	C817	CQMA332J50
	C820	CQMA471J50
	C818	CQMA681J50
	C808	CQMA821J50
	C854	CQSA102J50
	C853	CQSA152J50

RESISTORS

Mark	Symbol & Description	Part No.
	VR701 Semi-fixed (10kΩ)	ACP1025
	VR705 – VR707,VR709 – VR740 Semi-fixed (4.7kΩ)	ACP1024
	VR708 Semi-fixed (22kΩ)	ACP1026
	VR702,VR703 Semi-fixed (47kΩ)	ACP1027
	VR704 Semi-fixed (220kΩ)	ACP1029
	R452,R453 (4.7Ω/5W)	ACN1059
	R459	RD1/2PMFL560J
	R103,R104,R455,R457,R460	RD1/4PMFL□□□J
	R456,R458,R461,R480,R481	RS1LMF□□□J
	R101,R102,R451,R454, R475 – R479	RS2LMF□□□J
	Other resistors	RD1/8PM□□□J

R. CRT Assembly (AWZ2530)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	Q801	2SC2278
	D801	1SS252

COILS

Mark	Symbol & Description	Part No.
	L803	LAU101K
	L801,L802	LAU470K

CAPACITORS

Mark	Symbol & Description	Part No.
	C924 (1000p/2kV)	ACG1001
	C923 (4.7μ/250V)	ACH-378
	C921	CEAS101M16
	C922	CKCYB681K50

RESISTORS

Mark	Symbol & Description	Part No.
	R755 Solid (47Ω/1/2W)	ACN-225
	R752 Solid (1kΩ/1/2W)	ACN1006
	R751	RD1/8PM103J
	R753,R754	RS3LMF332J

OTHERS

Mark	Symbol & Description	Part No.
	CRT socket	AKG1003

G. CRT Assembly (AWZ2531)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	Q821	2SC2278
	D821	1SS252

COILS

Mark	Symbol & Description	Part No.
	L823	LAU101K
	L821,L822	LAU470K

CAPACITORS

Mark	Symbol & Description	Part No.
	C934 (1000p/2kV)	ACG1001
	C933 (4.7μ/250V)	ACH-378
	C931	CEAS101M16
	C932	CKCYB681K50

RESISTORS

Mark	Symbol & Description	Part No.
	R765 Solid (47Ω/1/2W)	ACN-225
	R762 Solid (1kΩ/1/2W)	ACN1006
	R761	RD1/8PM103J
	R763,R764	RS3LMF332J

OTHERS

Mark	Symbol & Description	Part No.
	CRT socket	AKG1003

B. CRT Assembly (AWZ2532)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	Q841	2SC2278
	D841	1SS252

COILS

Mark	Symbol & Description	Part No.
	L843	LAU101K
	L841,L842	LAU470K

CAPACITORS

Mark	Symbol & Description	Part No.
	C944 (1000p/2kV)	ACG1001
	C943 (4.7μ/250V)	ACH-378
	C941	CEAS101M16
	C942	CKCYB681K50

RESISTORS

Mark	Symbol & Description	Part No.
	R775 Solid (47Ω/1/2W)	ACN-225
	R772 Solid (1kΩ/1/2W)	ACN1006
	R771	RD1/8PM103J
	R773,R774	RS3LMF332J

OTHERS

Mark	Symbol & Description	Part No.
	CRT socket	AKG1003

FRONT CONTROL Assembly (AWZ2539)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	PC861 CdS	SC-05-8S
	Q861	2SC1740S
	D861	AEL-459

SWITCHES

Mark	Symbol & Description	Part No.
	S861 – S875 Tact switch (POWER, ANTENNA, FACTORY ADJ MODE, INPUT SELECTOR, CHANNEL (+, –), VOLUME (+, –), STD/AV MEM, DPO, PINP (ON/OFF, INPUT), PRESET MENU (ON/OFF, SELECT, SET))	ASG-703

CAPACITOR

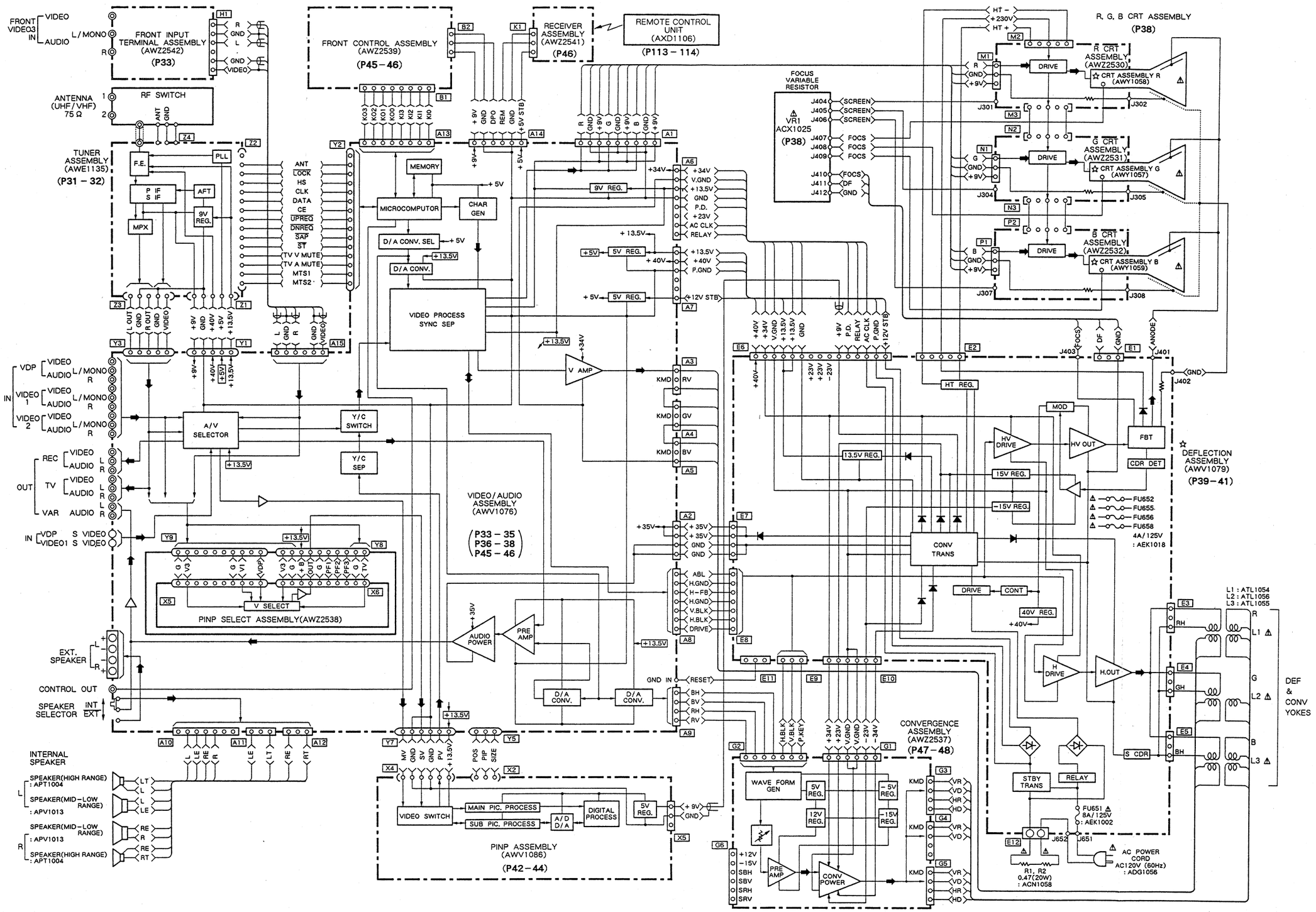
Mark	Symbol & Description	Part No.
	C951	CEJA470M10

RESISTORS

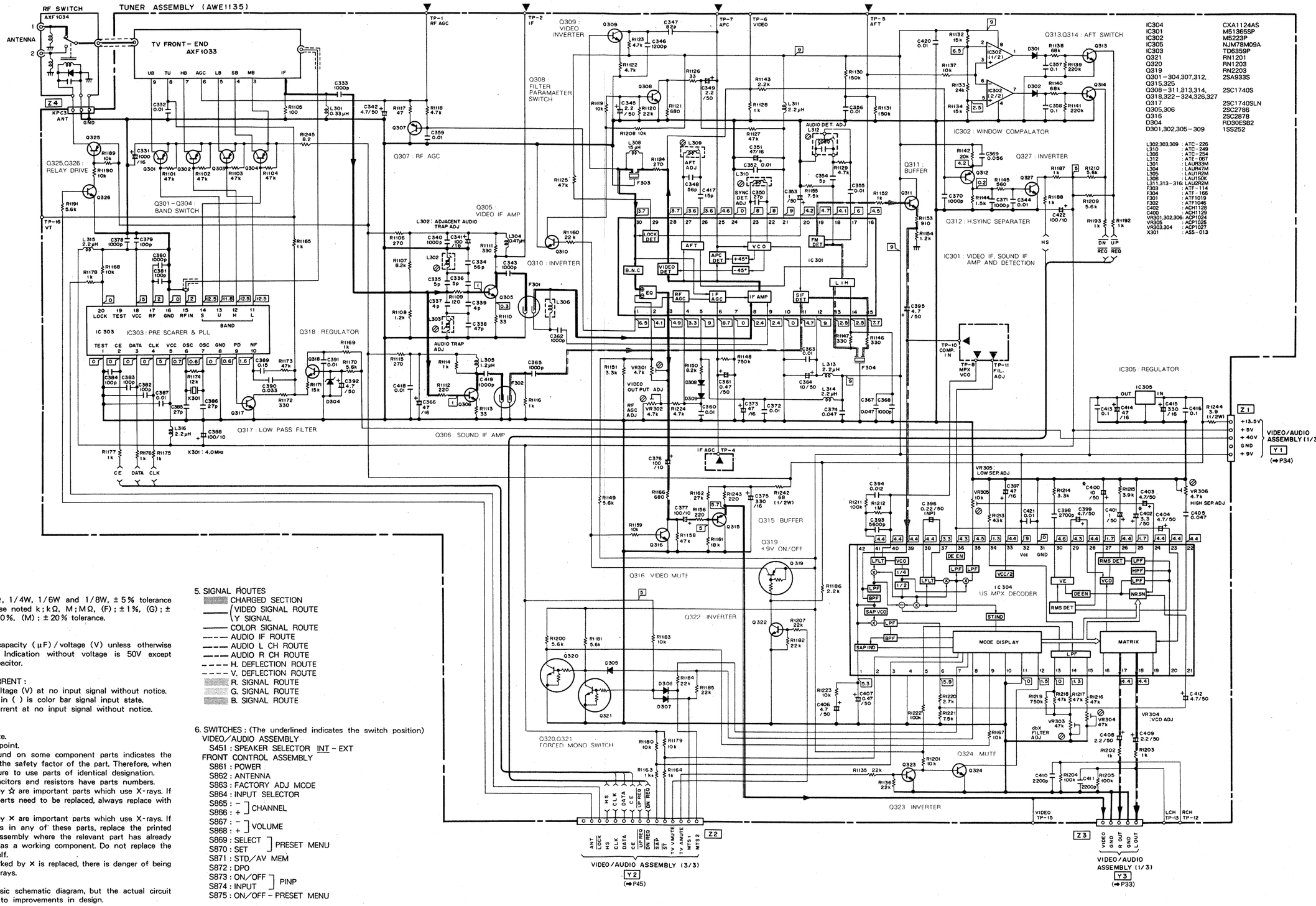
Mark	Symbol & Description	Part No.
	VR861 Semi-fixed (47kΩ)	VRTS6VS473
	R531 – R535	RD1/8PM□□□J

8. SCHEMATIC AND P.C. BOARDS DIAGRAMS

8.1 OVERALL WIRING DIAGRAM



8.2 TUNER ASSEMBLY



1. RESISTORS :
Indicated in Ω, 1/4W, 1/6W and 1/8W, ± 5% tolerance unless otherwise noted k ; kΩ, M ; MΩ, (F) ; ± 1%, (G) ; ± 2%, (K) ; ± 10%, (M) ; ± 20% tolerance.

2. CAPACITORS :
Indicated in capacity (μF) / voltage (V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT :
▭ ; DC voltage (V) at no input signal without notice.
Value in ( ) is color bar signal input state.
⇦mA ; DC current at no input signal without notice.

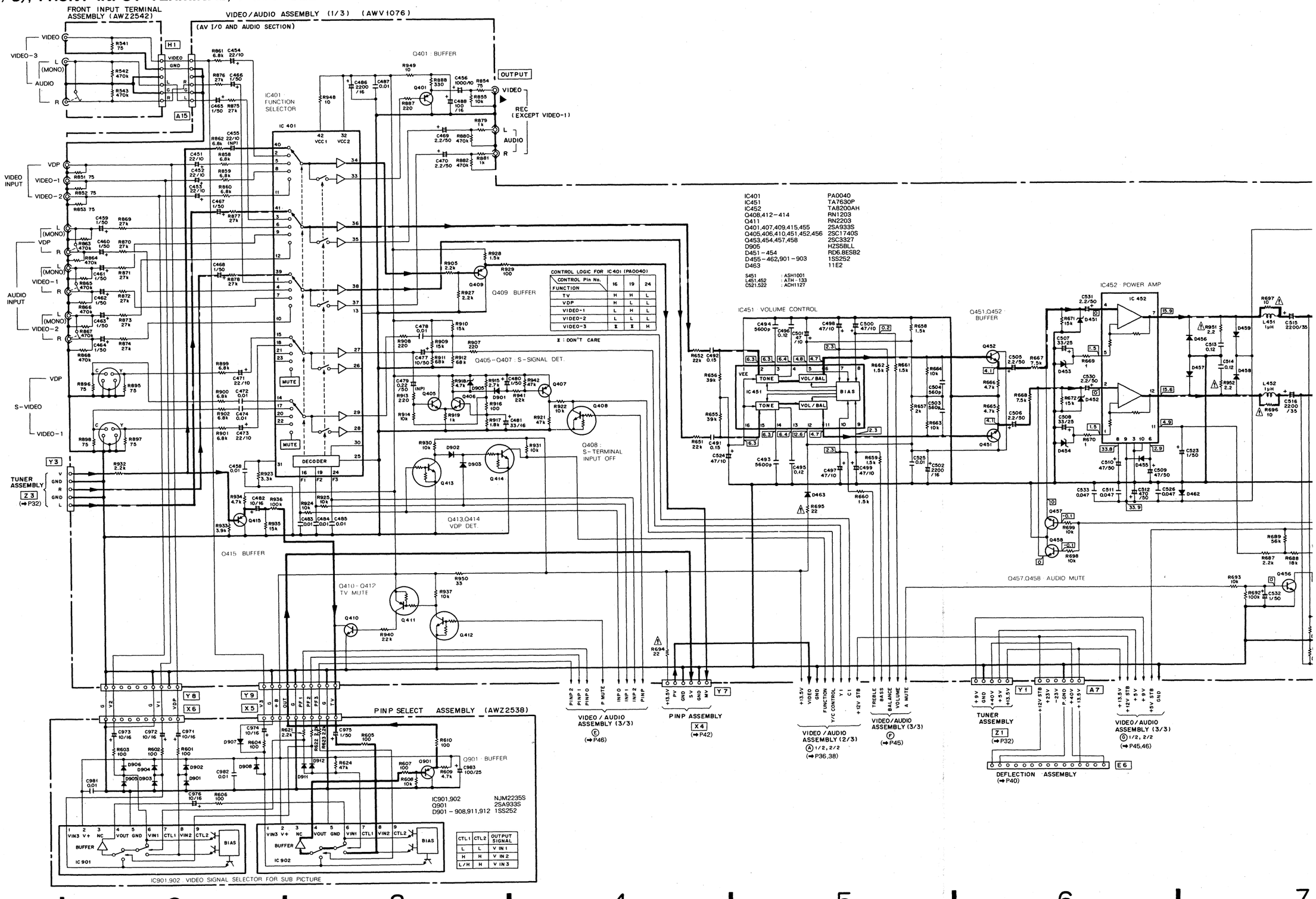
4. OTHERS :
➡ ; Signal route.
⊘ ; Adjusting point.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- ※ marked capacitors and resistors have parts numbers.
- Parts marked by ☆ are important parts which use X-rays. If any of these parts need to be replaced, always replace with specified parts.
- Parts marked by × are important parts which use X-rays. If a failure occurs in any of these parts, replace the printed circuit board assembly where the relevant part has already been adjusted as a working component. Do not replace the actual part itself.
If any part marked by × is replaced, there is danger of being exposed to X-rays.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SIGNAL ROUTES
- CHARGED SECTION
- VIDEO SIGNAL ROUTE / Y SIGNAL
- COLOR SIGNAL ROUTE
- AUDIO IF ROUTE
- AUDIO L CH ROUTE
- AUDIO R CH ROUTE
- H. DEFLECTION ROUTE
- V. DEFLECTION ROUTE
- R. SIGNAL ROUTE
- G. SIGNAL ROUTE
- B. SIGNAL ROUTE

6. SWITCHES : (The underlined indicates the switch position)
VIDEO/AUDIO ASSEMBLY
S451 : SPEAKER SELECTOR INT - EXT
FRONT CONTROL ASSEMBLY
S861 : POWER
S862 : ANTENNA
S863 : FACTORY ADJ MODE
S864 : INPUT SELECTOR
S865 : - / +] CHANNEL
S866 : +]
S867 : - / +] VOLUME
S868 : +]
S869 : SELECT / S870 : SET] PRESET MENU
S871 : STD/AV MEM
S872 : DPO
S873 : ON/OFF / S874 : INPUT] PINP
S875 : ON/OFF - PRESET MENU

8.3 VIDEO/AUDIO (1/3), FRONT INPUT TERMINAL, P IN P SELECT ASSEMBLIES



MBLIES

5)

Q401 : BUFFER

OUTPUT

VIDEO

REC (EXCEPT VIDEO-1)

L

AUDIO

R

IC401 PA0040
IC451 TA7630P
IC452 TA8200AH
Q408,412-414 RN1203
Q411 RN2203
Q401,407,409,415,455 2SA933S
Q405,406,410,451,452,456 2SC1740S
Q453,454,457,458 2SC3327
D905 HZS5BLL
D451-454 RD6.8ESB2
D455-462,901-903 1SS252
D463 11E2

S451 : ASH1001
L451,452 : ATH-133
C521,522 : ACH1127

CONTROL LOGIC FOR IC401 (PA0040)

CONTROL Pin No. / FUNCTION	16	19	24
TV	H	H	L
VDP	H	L	L
VIDEO-1	L	H	L
VIDEO-2	L	L	L
VIDEO-3	X	X	H

X : DON'T CARE

Q409 BUFFER

Q405-Q407 : S-SIGNAL DET.

Q408 : S-TERMINAL INPUT OFF

Q413,Q414 : VDP DET

Q412

IC451 : VOLUME CONTROL

IC452 : POWER AMP

Q451,Q452 BUFFER

Q457,Q458 : AUDIO MUTE

Q455,Q456 AUDIO MUTE DRIVE

Q453,Q454 AUDIO MUTE

S451 : SPEAKER SELECTOR

EXTERNAL SPEAKER

INTERNAL SPEAKER

HIGH RANGE APT1004

MID-LOW RANGE APV1013

HIGH RANGE APT1004

AUDIO OUTPUT (VARIABLE)

DEFLECTION ASSEMBLY (⇒P40)

VIDEO / AUDIO ASSEMBLY (3/3) (E) (⇒P46)

PINP ASSEMBLY X4 (⇒P42)

VIDEO / AUDIO ASSEMBLY (2/3) (A) 1/2, 2/2 (⇒P36,38)

VIDEO / AUDIO ASSEMBLY (3/3) (F) (⇒P45)

TUNER ASSEMBLY Z1 (⇒P32)

VIDEO / AUDIO ASSEMBLY (3/3) (G) 1/2, 2/2 (⇒P45,46)

DEFLECTION ASSEMBLY (⇒P40) E6

ECT ASSEMBLY (AWZ2538)

Q901 : BUFFER

IC901,902 NJM2235S
Q901 2SA933S
D901-908,911,912 1SS252

CTL1	CTL2	OUTPUT SIGNAL
L	L	V IN1
H	H	V IN2
L/H	H	V IN3

8.4 VIDEO ASSEMBLY (2/3), R, G, B CRT ASSEMBLIES

VIDEO / AUDIO ASSEMBLY (2/3) (AWV1076)

(VIDEO SECTION)

TH601 IC103 IC102 IC101 IC601

TH101-2 AN5302K PA0030 TC4066BP NJM78M09A

Q102-104,109,110, Q116,117,128,129,132,134, Q137-141,145,147,148, Q150,154,156,157,162,167, Q168,171,172,604,609 : 2SA933S

Q105-108,113-115, Q118-122,127,133,135, Q136,144,146,149,152,160, Q161,163-165,606-608 : 2SC1740S

Q125,126,130,131,142, Q143,166 : 2SK246

Q601 : 2SB950A
Q603 : 2SC1845
Q602 : 2SD1276A

D112 : RD5.1ESB1
D106 : 1SS108
D101-103,109-111,115, D116,125-133,601-608, D610,611,613,614 : 1SS252
D107,108,113,114,121, D122 : OA90A-M

L150 : ATG1006
L105,106 : LAU1R8M
L114 : LAU100K
L101,108,110,151 : LAU150K
L103,104 : LAU3R9K
L111,112,115 : LAU4R7K
L107 : LAU680K
L109 : LAU820K
C695 : ACH 388
C681 : ACH1131

VR102 : ACP1021
VR101 : ACP1022
VR107 : ACP1023
VR105,601 : ACP1031
X101 : ASS-028
DL101 : ATN1011
DL102,104 : ATN1013
DL103 : ATN1014
X601 : ASS1033

Q102, 103, 167, 168 : Y-SIGNAL N. R

Q104-106 : BUFFER

Q107 : BUFFER

Q172 EQUALIZER

Q160 BUFFER

Q161-163 : VIDEO AMP

Q166 : Y-SIGNAL CLAMP

Q165 BUFFER

Q164 BUFFER

Q113 INVERTER

Q114 BUFFER

Q115 : BUFFER

Q108-110 C-SIGNAL N. R

IC102 : SHARPNESS

IC101 S-TERMINAL SWITCH

Q116-118 BUFFER

Q119-122 COMB FILTER

VR101, L150 : COMB FILTER ADJ

Q608 ABL BUFFER

Q129 : BUFFER

Q604, 605 : SYNC SEPARATOR

IC103 : VIDEO, CHROMA AND DEFLECTION SIGNAL PROCESSOR

3.579545 MHz X101

Q135, 154 BUFFER

Q136-140 AUTOMATIC CONTRAST LIMITER FOR PEAK

Q141 BUFFER

IC601 REGULATOR

Q601-603 VERTICAL DRIVE AMP

Q606 : BUFFER

Q607 : V. SIGNAL DET. FOR CRT PROTECTION

VR601 : V. SIZE ADJ.

Q609 : CURREN

Q127 : R-Y INVERTER AMP

Q125, 157 BUFFER

Q126 : R-Y CLAMP

Q128 : Y-SIGNAL BUFFER

Q133 : G-Y INVERTER AMP

Q130, 132 BUFFER

Q131 : G-Y CLAMP

Q134 : Y-SIGNAL BUFFER

Q156 BUFFER

Q145 : Y-SIGNAL BUFFER

Q142 : BUFFER Q143 : B-Y CLAMP

Q147, 148 VIDEO MUTE

Q149 R-Y, G-Y, B-Y CLAMP

Q150, 152 : BUFFER

VR102 : R DRIVE ADJ

VR105 : B DRIVE ADJ

VIDEO / AUDIO ASSEMBLY (1/3) Ⓐ 1/2 (➡P34)

VIDEO / AUDIO ASSEMBLY (3/3) Ⓑ 1/2,2/2 (➡P45)

VIDEO / AUDIO ASSEMBLY (3/3) Ⓒ (➡P46)

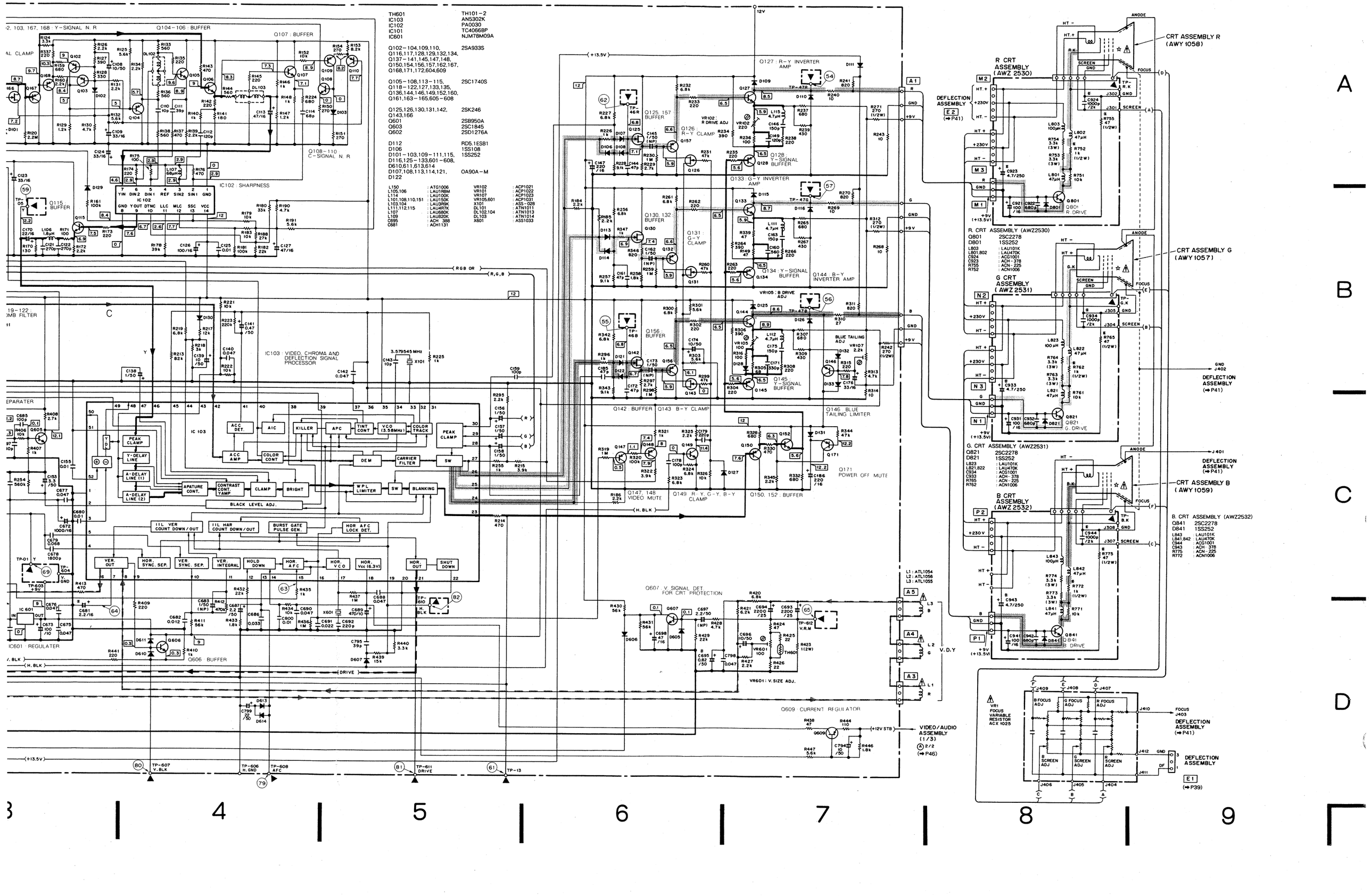
VIDEO / AUDIO ASSEMBLY (3/3) Ⓓ (➡P45)

DEFLECTION ASSEMBLY E 8 (➡P39)

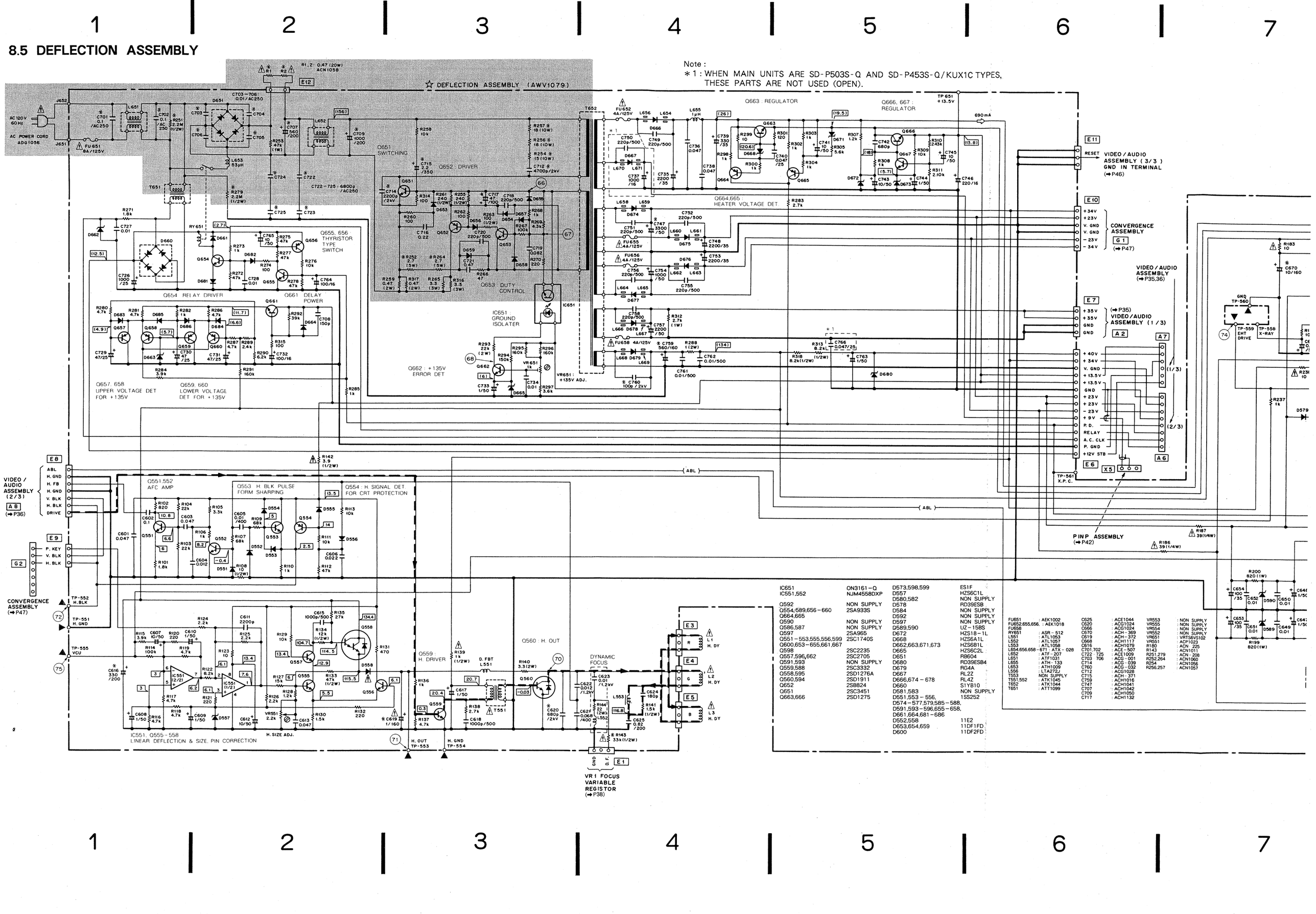
DEFLECTION ASSEMBLY E 6 (➡P40)

FUNCTION, Y1, Y/C CONTROL, C1, GND, BRIGHT, RGB OR, R, G, B, VIDEO, ABL, TINT, +13.5V, GND, CONT, H. GND, H.-F.B, V. BLK, H. BLK, DRIVE, A 8, +34V, GND(34), +13.5V, GND(13.5), P. D, +23V, AC CLK, RELAY, A 6

TP-12, TP-01, TP-05, TP-41, TP-601, TP-603 +9V, TP-604, TP-610, TP-611, TP-612 V.R.M, TP-13, TP-602 +34V, TP-605 V.GND, TP-609 V.OUT, TP-607 V.BLK, TP-606 H.GND, TP-608 A.F.C, TP-611 DRIVE


TH601 TH101-2
IC103 AN5302K
IC102 PA0030
IC101 TC4066BP
IC601 NJM78M09A
Q102-104,109,110, 116,117,128,129,132,134, 137-141,145,147,148, 150,154,156,157,162,167, 168,171,172,604,609 2SA933S
Q105-108,113-115, 118-122,127,133,135, 136,144,146,149,152,160, 161,163-165,605-608 2SC1740S
Q125,126,130,131,142, Q143,166 2SK246
Q601 2SB950A
Q603 2SC1845
Q602 2SD1276A
D112 RD5.1ESB1
D106 1SS108
D101-103,109-111,115, D116,125-133,601-608, D610,611,613,614 1SS252
D107,108,113,114,121, D122 0A90A-M
L150 : ATG1006
L105,106 : LAU1R8M
L114 : LAU100K
L101,108,110,151 : LAU150K
L103,104 : LAU3R9K
L111,112,115 : LAU4R7K
L107 : LAU680K
L109 : LAU820K
C695 : ACH-388
C681 : ACH1131
VR102 : ACP1021
VR101 : ACP1022
VR107 : ACP1023
VR105,601 : ACP1031
X101 : ASS-026
DL101 : ATN1011
DL102,104 : ATN1013
DL103 : ATN1014
X601 : ASS1033
Q107 : BUFFER
Q104-106 : BUFFER
Q108-110 C-SIGNAL N. R
IC102 : SHARPNESS
Q115 BUFFER
IC103 : VIDEO, CHROMA AND DEFLECTION SIGNAL PROCESSOR
IC601 : REGULATER
Q606 BUFFER
Q127 : R-Y INVERTER AMP
Q125, 157 BUFFER
Q126 : R-Y CLAMP
VR102 : R DRIVE ADJ
Q128 Y-SIGNAL BUFFER
Q133 : G-Y INVERTER AMP
Q130, 132 BUFFER
Q131 : G-Y CLAMP
Q134 : Y-SIGNAL BUFFER
Q144 : B-Y INVERTER AMP
VR105 : B DRIVE ADJ
Q156 BUFFER
Q145 Y-SIGNAL BUFFER
BLUE TAILING ADJ
Q142 : BUFFER
Q143 B-Y CLAMP
Q146 BLUE TAILING LIMITER
Q147, 148 VIDEO MUTE
Q149 R-Y, G-Y, B-Y CLAMP
Q150, 152 : BUFFER
Q171 POWER OFF MUTE
Q607 : V. SIGNAL DET. FOR CRT PROTECTION
VR601 : V. SIZE ADJ.
V. D. Y
Q609 : CURRENT REGULATOR
VIDEO/AUDIO ASSEMBLY (1/3)
R CRT ASSEMBLY (AWZ 2530)
CRT ASSEMBLY R (AWY 1058)
DEFLECTION ASSEMBLY
R CRT ASSEMBLY (AWZ2530)
Q801 2SC2278
D801 1SS252
L803 : LAU101K
L801,802 : LAU470K
C924 : ACG1001
C923 : ACH-378
R755 : ACN-225
R752 : ACN1006
Q801 R. DRIVE
G CRT ASSEMBLY (AWZ 2531)
CRT ASSEMBLY G (AWY 1057)
G. CRT ASSEMBLY (AWZ2531)
Q821 2SC2278
D821 1SS252
L823 : LAU101K
L821,822 : LAU470K
C934 : ACG1001
C933 : ACH-378
R765 : ACN-225
R762 : ACN1006
Q821 G. DRIVE
B CRT ASSEMBLY (AWZ 2532)
CRT ASSEMBLY B (AWY 1059)
B. CRT ASSEMBLY (AWZ2532)
Q841 2SC2278
D841 1SS252
L843 : LAU101K
L841,842 : LAU470K
C944 : ACG1001
C943 : ACH-378
R775 : ACN-225
R772 : ACN1006
Q841 DRIVE
VR1 FOCUS VARIABLE RESISTOR ACX 1025
B FOCUS ADJ
G FOCUS ADJ
R FOCUS ADJ
B SCREEN ADJ
G SCREEN ADJ
R SCREEN ADJ
FOCUS J403 DEFLECTION ASSEMBLY (⇒P41)
DEFLECTION ASSEMBLY E1 (⇒P39)
GND J402 DEFLECTION ASSEMBLY (⇒P41)
J401 DEFLECTION ASSEMBLY (⇒P41)

8.5 DEFLECTION ASSEMBLY



IC651	ON3161–Q	D573,598,599	ES1F		
IC551,552	NJM4558DXP	D557	HZS6C1L		
	NON SUPPLY	D580,582	NON SUPPLY		
Q592	2SA933S	D578	RD39ESB		
Q554,589,656–660		D584	NON SUPPLY		
Q664,665	NON SUPPLY	D592	NON SUPPLY		
Q590	NON SUPPLY	D597	NON SUPPLY		
Q586,587	2SA965	D589,590	UZ–15BS		
Q597	2SC1740S	D672	HZS18–1L		
Q551–553,555,556,599		D668	HZS5A1L		
Q600,653–655,661,667	2SC2235	D662,663,671,673	HZS6B1L		
Q598	2SC2705	D665	HZS6C2L		
Q557,596,662	NON SUPPLY	D651	RB604		
Q591,593	2SC3332	D680	RD39ESB4		
Q559,588	2SD1276A	D679	RG4A		
Q558,595	2SD1911	D667	RL2Z		
Q560,594	2SB824	D666,674–678	RL4Z		
Q652	2SC3451	D660	S1YB10		
Q651	2SD1275	D581,583	NON SUPPLY		
Q663,666		D551,553–556, D574–577,579,585–588, D591,593–596,655–658, D661,664,681–686	1SS252		
		D552,558	11E2		
		D653,654,659	11DF1FD		
		D600	11DF2FD		

FU651	: AEK1002	C625	: ACE1044	VR553	: NON SUPPLY		
FU652,655,656,	: AEK1018	C520	: ACG1024	VR555	: NON SUPPLY		
FU658		C666	: ACG1024	VR554	: NON SUPPLY		
RY651	: ASR–512	C670	: ACH–369	VR552	: NON SUPPLY		
L551	: ATL1053	C619	: ACH–372	VR651	: VRTS6VS102		
L552	: ATL1057	C668	: ACH1117	VR551	: ACP1023		
L553	: ATL1058	C616	: ACH1079	R180	: ACN 225		
L654,656,658–671	: ATX – 028	C701,702	: ACE–507	R143	: ACN1011		
L652	: ATF–207	C722, 725	: ACE1009	R251,279	: ACN 208		
L651	: ATF1031	C703, 706	: ACG–001	R252,264	: ACN1060		
L655	: ATH–133	C714	: ACG–039	R254	: ACN1056		
L653	: ATH1009	C760	: ACG–032	R256,257	: ACN1057		
L556	: LTA272J	C712	: ACG1028				
T553	: NON SUPPLY	C715	: ACH– 371				
T551,552	: ATK1045	C759	: ACH1016				
T652	: ATK1044	C747	: ACH1041				
T651	: ATT1099	C707	: ACH1042				
		C709	: ACH1050				
		C717	: ACH1132				

Note :
＊1 : WHEN MAIN UNITS ARE SD-P503S-Q AND SD-P453S-Q/KUX1C TYPES, THESE PARTS ARE NOT USED (OPEN).

SEMBLY (AWV1079)

Q663 : REGULATOR

Q666, 667 : REGULATOR

Q664,665 : HEATER VOLTAGE DET.

690mA

E11 RESET → VIDEO/AUDIO ASSEMBLY (3/3) GND IN TERMINAL (➡P46)

E10 +34V, +23V, V. GND, V. GND, −23V, −34V → CONVERGENCE ASSEMBLY G1 (➡P47)

E7 +35V, +35V, GND, GND → (➡P35) VIDEO/AUDIO ASSEMBLY (1 / 3) A2

A7 → (1/3), (2/3)

+40V, +34V, V. GND, +13.5V, +13.5V, GND, +23V, +23V, −23V, +9V, P.D., RELAY, A.C. CLK, P. GND, +12V STB → A6

E6 X5 TP-561 X.P.C.

VIDEO/AUDIO ASSEMBLY (➡P35,36)

PINP ASSEMBLY (➡P42)

Q595−600 : HIGH VOLTAGE CONTROL

Q588 : HIGH VOLTAGE DRIVER

Q594 HIGH VOLTAGE OUT

Q586, 587 X-RAYS PROTECTION

Q591−593 ANODE CURRENT DET

IC552 AMP

Q589, 590 : REGULATOR

E2 HT − / +230V (+240V) / HT + → R.CRT ASSEMBLY M2 (➡P38)

J401 ANODE, J403 FOCUS, J402 GND → CRT ASSEMBLY R.G.B. (➡P38)

Q560 : H. OUT

DYNAMIC FOCUS

E3 R, E4 G, E5 B → L1 H.DY, L2 H.DY, L3 H.DY

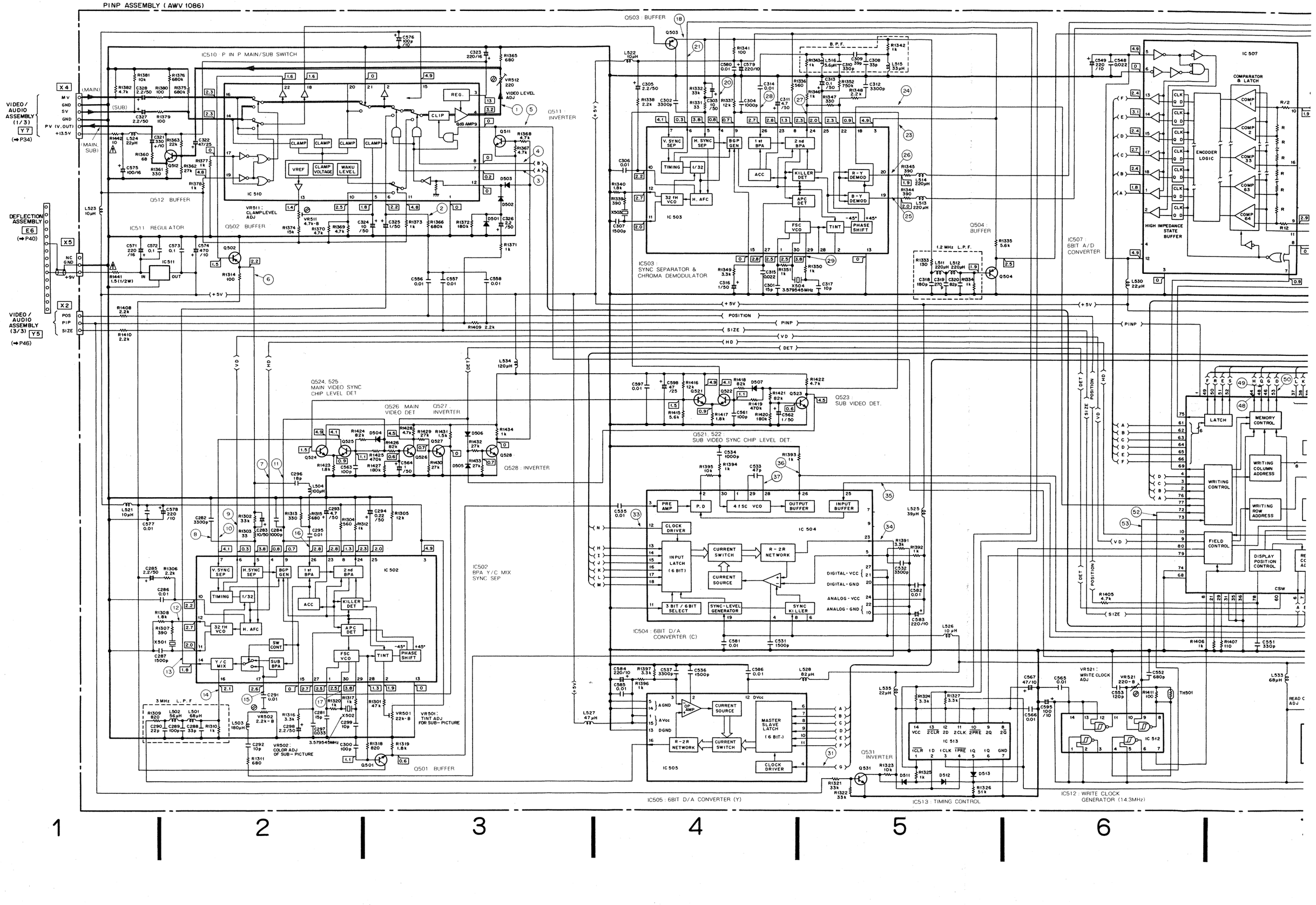
E1 GND, D.F. → VR1 FOCUS VARIABLE REGISTOR (➡P38)

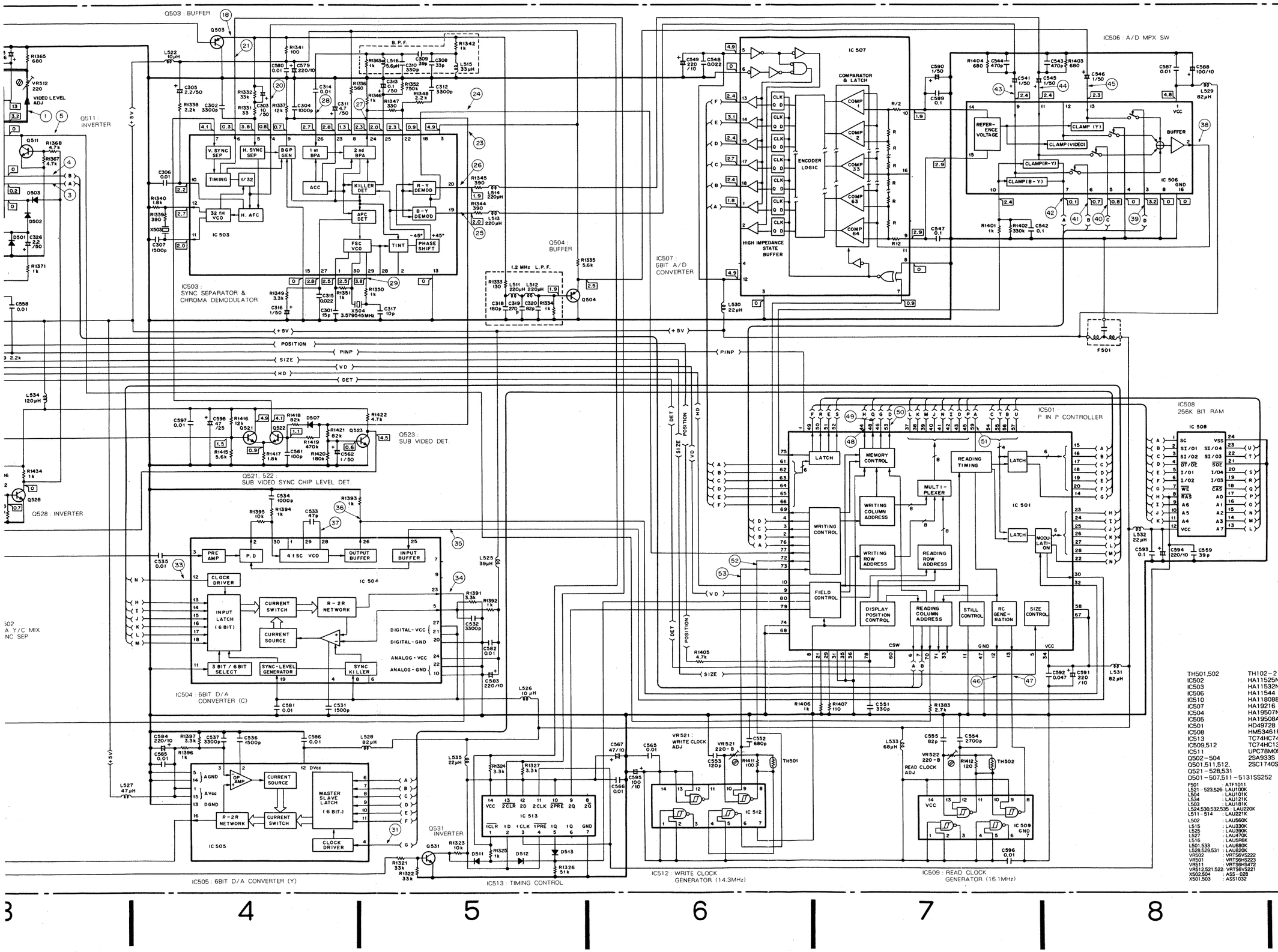
IC651	ON3161-Q	D573,598,599	ES1F		
IC551,552	NJM4558DXP	D557	HZS6C1L		
		D580,582	NON SUPPLY		
Q592	NON SUPPLY	D578	RD39ESB		
Q554,589,656−660	2SA933S	D584	NON SUPPLY		
Q664,665		D592	NON SUPPLY		
Q590	NON SUPPLY	D597	NON SUPPLY		
Q586,587	NON SUPPLY	D589,590	UZ−15BS		
Q597	2SA965	D672	HZS18−1L		
Q551−553,555,556,599	2SC1740S	D668	HZS6A1L		
Q600,653−655,661,667		D662,663,671,673	HZS6B1L		
Q598	2SC2235	D665	HZS6C2L		
Q557,596,662	2SC2705	D651	RB604		
Q591,593	NON SUPPLY	D680	RD39ESB4		
Q559,588	2SC3332	D679	RG4A		
Q558,595	2SD1276A	D667	RL2Z		
Q560,594	2SD1911	D666,674 − 678	RL4Z		
Q652	2SB824	D660	S1YB10		
Q651	2SC3451	D581,583	NON SUPPLY		
Q663,666	2SD1275	D551,553 − 556, D574−577,579,585−588, D591,593−596,655−658, D661,664,681−686	1SS252		
		D552,558	11E2		
		D653,654,659	11DF1FD		
		D600	11DF2FD		

FU651	: AEK1002	C625	: ACE1044	VR553	: NON SUPPLY		
FU652,655,656,	: AEK1018	C620	: ACG1024	VR555	: NON SUPPLY		
FU658		C666	: ACG1024	VR554	: NON SUPPLY		
RY651	: ASR−512	C670	: ACH−369	VR552	: NON SUPPLY		
L551	: ATL1053	C619	: ACH−372	VR651	: VRT56VS102		
L552	: ATL1057	C668	: ACH1117	VR551	: ACP1023		
L553	: ATL1058	C616	: ACH1079	R180	: ACN−225		
L654,656,658−671	: ATX−028	C701,702	: ACE−507	R143	: ACN1011		
L652	: ATF−207	C722・725	: ACE1009	R251,279	: ACN−208		
L651	: ATF1031	C703・706	: ACG−001	R252,264	: ACN1060		
L655	: ATH−133	C714	: ACG−039	R254	: ACN1056		
L653	: ATH1009	C760	: ACG−032	R256,257	: ACN1057		
L556	: LTA272J	C712	: ACG1028				
T553	NON SUPPLY	C715	: ACH−371				
T551,552	: ATK1045	C759	: ACH1016				
T652	: ATK1044	C747	: ACH1041				
T651	: ATT1099	C707	: ACH1042				
		C709	: ACH1050				
		C717	: ACH1132				

8.6 PINP ASSEMBLY

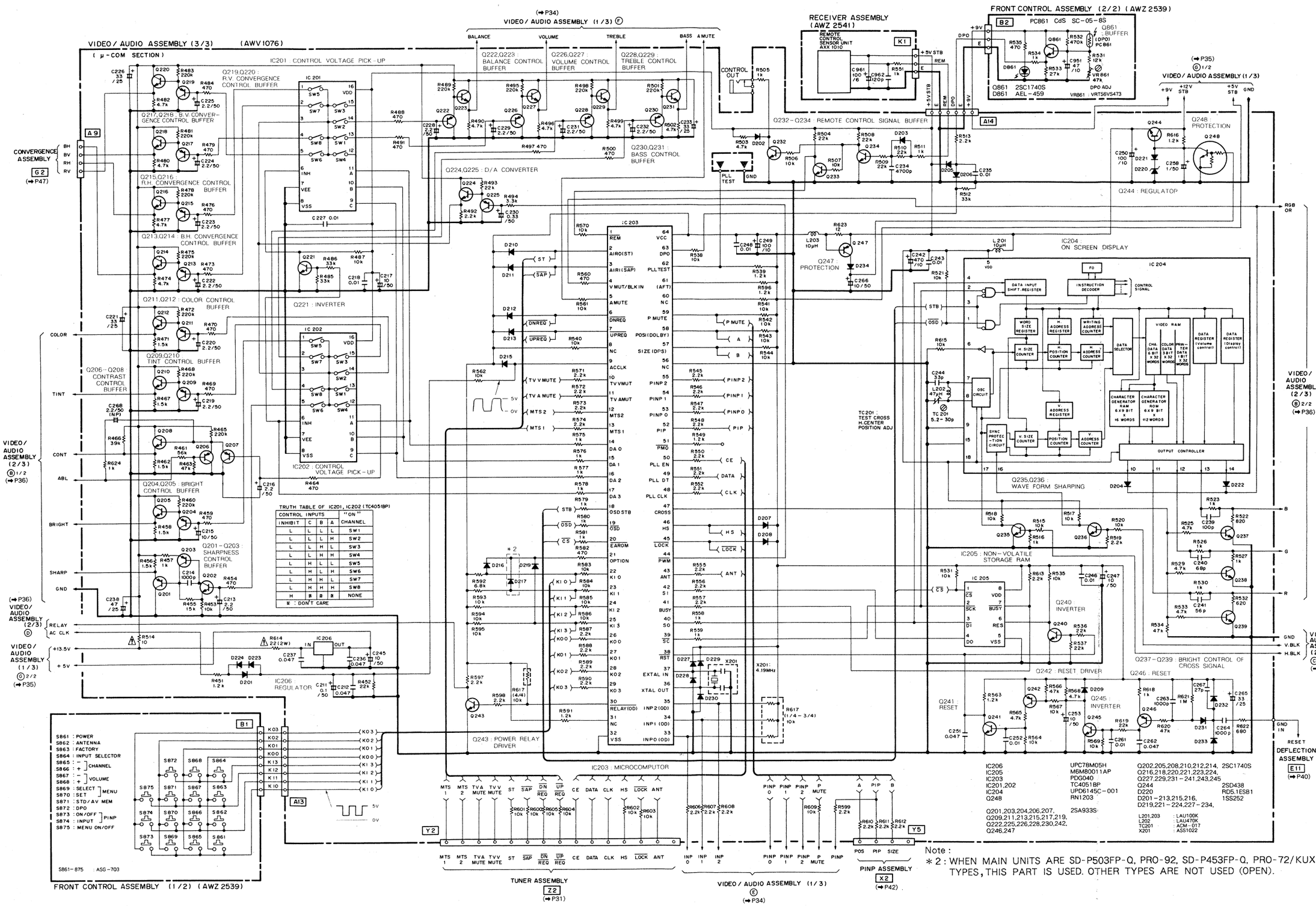
PINP ASSEMBLY (AWV 1086)



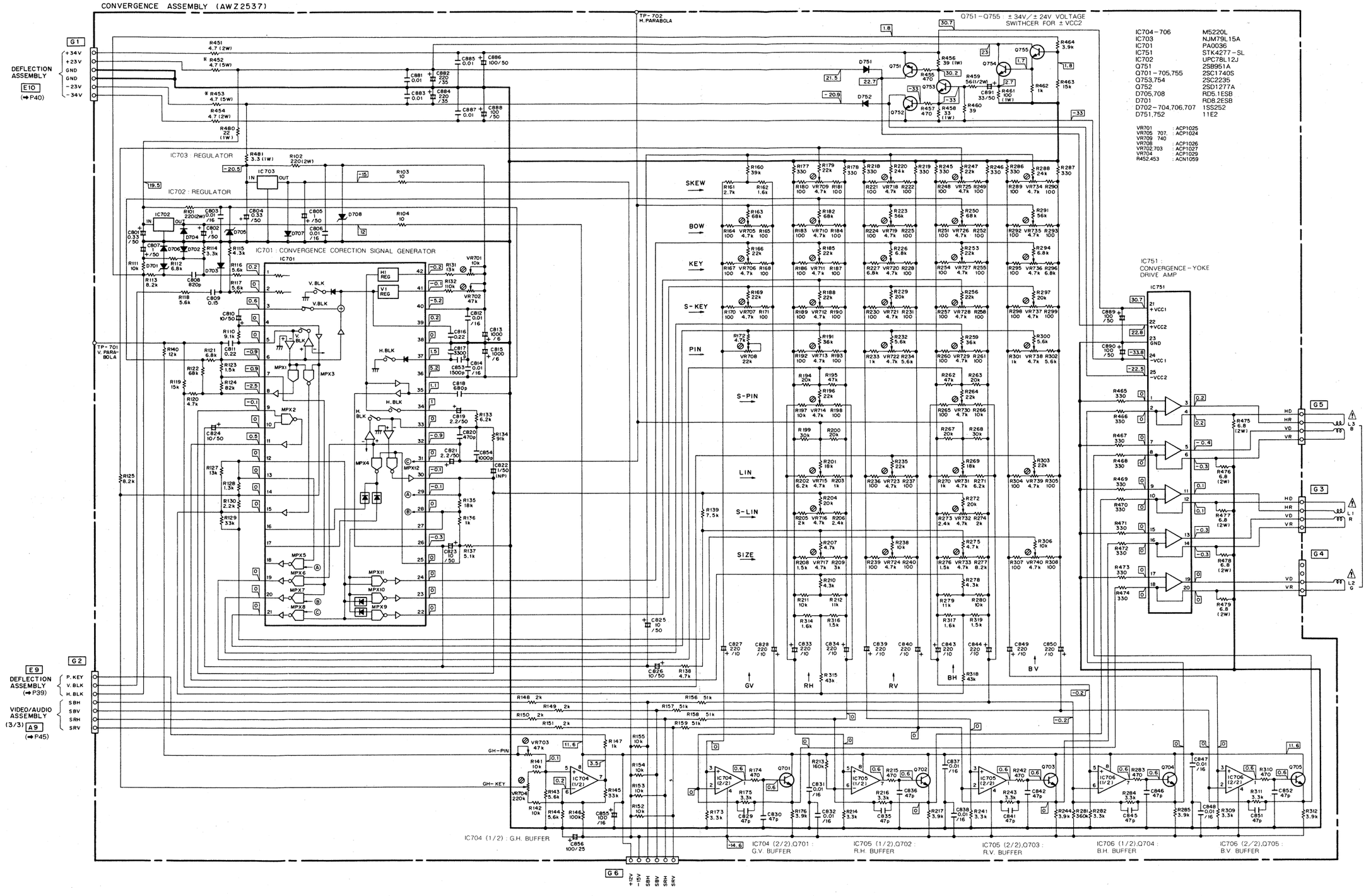


TH501,502	TH102-2
IC502	HA11525NT
IC503	HA11532NT
IC506	HA11544
IC510	HA118088NT
IC507	HA19216
IC504	HA19507NT
IC505	HA19508A
IC501	HD49728
IC508	HM53461P-12
IC513	TC74HC74AP
IC509,512	TC74HC132AP
IC511	UPC78M05H
Q502-504	2SA933S
Q501,511,512, Q521-528,531	2SC1740S
D501-507,511-5131SS252	

F501 : ATF1011
L521-523,526 : LAU100K
L504 : LAU101K
L534 : LAU121K
L503 : LAU181K
L524,530,532,535 : LAU220K
L511-514 : LAU221K
L502 : LAU560K
L515 : LAU330K
L525 : LAU390K
L527 : LAU470K
L516 : LAU5R6K
L501,533 : LAU680K
L528,529,531 : LAU820K
VR502 : VRTS6VS222
VR501 : VRTS6HS223
VR511 : VRTS6HS472
VR512,521,522 : VRTS6VS221
X502,504 : ASS-028
X501,503 : ASS1032


VIDEO/AUDIO ASSEMBLY (3/3) (AWV1076)
(μ-COM SECTION)
IC201 : CONTROL VOLTAGE PICK-UP
Q219,Q220 : R.V. CONVERGENCE CONTROL BUFFER
Q217,Q218 : B.V. CONVERGENCE CONTROL BUFFER
Q215,Q216 : R.H. CONVERGENCE CONTROL BUFFER
Q213,Q214 : B.H. CONVERGENCE CONTROL BUFFER
Q211,Q212 : COLOR CONTROL BUFFER
Q209,Q210 TINT CONTROL BUFFER
Q206 - Q208 CONTRAST CONTROL BUFFER
Q204,Q205 : BRIGHT CONTROL BUFFER
Q201 - Q203 : SHARPNESS CONTROL BUFFER
Q221 : INVERTER
IC202 : CONTROL VOLTAGE PICK-UP
IC206 : REGULATOR
Q243 : POWER RELAY DRIVER
Q224,Q225 : D/A CONVERTER
Q222,Q223 : BALANCE CONTROL BUFFER
Q226,Q227 : VOLUME CONTROL BUFFER
Q228,Q229 : TREBLE CONTROL BUFFER
Q230,Q231 : BASS CONTROL BUFFER
(→P34) VIDEO/AUDIO ASSEMBLY (1/3) (F)
RECEIVER ASSEMBLY (AWZ2541)
REMOTE CONTROL SENSOR UNIT AXX1010
Q232 - Q234 : REMOTE CONTROL SIGNAL BUFFER
FRONT CONTROL ASSEMBLY (2/2) (AWZ2539)
PC861 CdS SC-05-8S
Q861 2SC1740S
D861 AEL-459
VR861 : VRTS6VS473
(→P35) VIDEO/AUDIO ASSEMBLY (1/3)
Q244 : REGULATOR
Q248 : PROTECTION
Q247 : PROTECTION
IC204 : ON SCREEN DISPLAY
IC205 : NON-VOLATILE STORAGE RAM
Q240 INVERTER
Q241 : RESET
Q242 : RESET DRIVER
Q245 : INVERTER
Q246 : RESET
Q237 - Q239 : BRIGHT CONTROL OF CROSS SIGNAL
Q235,Q236 : WAVE FORM SHARPING
TC201 : TEST CROSS H.CENTER POSITION ADJ
X201 : 4.19MHz
IC203 : MICROCOMPUTOR
TRUTH TABLE OF IC201, IC202 (TC4051BP)
CONTROL INPUTS
"ON" CHANNEL
FRONT CONTROL ASSEMBLY (1/2) (AWZ2539)
S861 : POWER
S862 : ANTENNA
S863 : FACTORY
S864 : INPUT SELECTOR
S865 : - CHANNEL
S866 : +
S867 : - VOLUME
S868 : +
S869 : SELECT MENU
S870 : SET
S871 : STD/AV MEM
S872 : DPO
S873 : ON/OFF PINP
S874 : INPUT
S875 : MENU ON/OFF
S861-875 : ASG-703
TUNER ASSEMBLY Z2 (→P31)
VIDEO/AUDIO ASSEMBLY (1/3) (E) (→P34)
PINP ASSEMBLY X2 (→P42)
VIDEO/AUDIO ASSEMBLY (2/3) (B) 2/2 (→P36)
VIDEO/AUDIO ASSEMBLY (2/3) (B) 1/2 (→P36)
VIDEO/AUDIO ASSEMBLY (1/3) (G) 2/2 (→P35)
CONVERGENCE ASSEMBLY G2 (→P47)
DEFLECTION ASSEMBLY E10 (→P40)
DEFLECTION ASSEMBLY E11 (→P40)
DEFLECTION ASSEMBLY E9 (→P39)
VIDEO/AUDIO ASSEMBLY (3/3) A9 (→P45)
VIDEO/AUDIO ASSEMBLY (2/3) (C) (→P36)
IC206 REGULATOR
IC205
IC203
IC201,202
IC204
Q248
UPC78M05H
M6M80011AP
PDG040
TC4051BP
UPD6145C-001
RN1203
2SA933S
Q202,205,208,210,212,214, 216,218,220,221,223,224, Q227,229,231-241,243,245 Q244
D220
D201-213,215,216, D219,221-224,227-234,
2SC1740S
2SD438
RD5.1ESB1
1SS252
L201,203 : LAU100K
L202 : LAU470K
TC201 : ACM-017
X201 : ASS1022
Note :
* 2 : WHEN MAIN UNITS ARE SD-P503FP-Q, PRO-92, SD-P453FP-Q, PRO-72/KUX1C TYPES, THIS PART IS USED. OTHER TYPES ARE NOT USED (OPEN).

8.8 CONVERGENCE ASSEMBLY

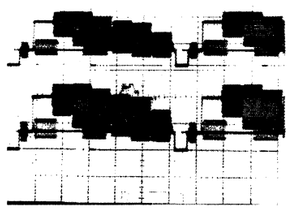


The waveforms at each position

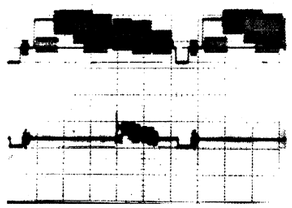
Input signal ;
① – ㊸ : EIA color bar (without notice)
Upper : MAIN or SUB signal input
(V : 0. 5V/div, H : 10μsec/div) (without notice)
Lower : Waveforms at each position

㊹ – ㊽ : color bar VDP input
Picture quality : standard
Range : DC range (without notice)

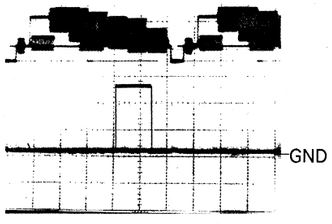
① IC510 Pin 4
V : 1V/div, H : 10μsec/div



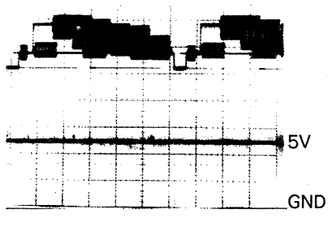
② IC510 Pin 6
V : 1V/div, H : 10μsec/div



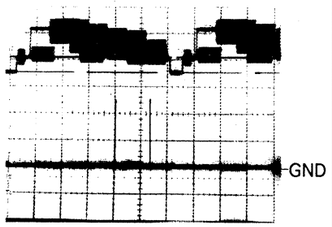
③ IC510 Pin 7
V : 2V/div, H : 10μsec/div



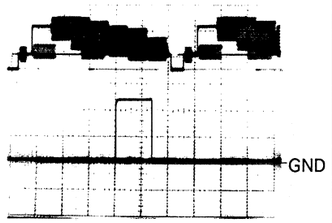
V : 2V/div, H : 10μsec/div
Input SUB signal only.
Output level becomes "H".



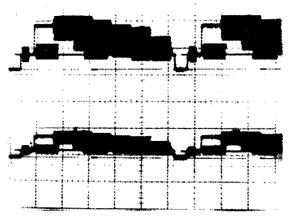
④ IC510 Pin 8
V : 2V/div, H : 10μsec/div



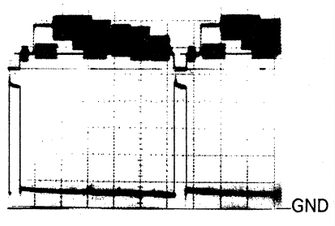
⑤ IC510 Pin 9
V : 2V/div, H : 10μsec/div



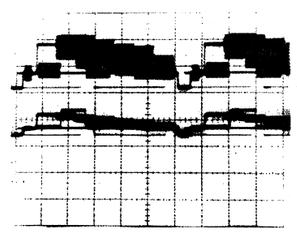
⑥ Q502 Emitter
V : 1V/div, H : 10μsec/div



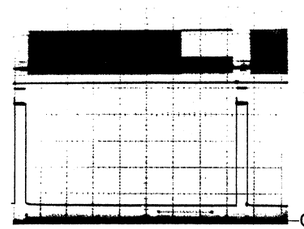
⑦ IC502 Pin 4
V : 1V/div, H : 10μsec/div



⑧ IC502 Pin 5
V : 1V/div, H : 10μsec/div

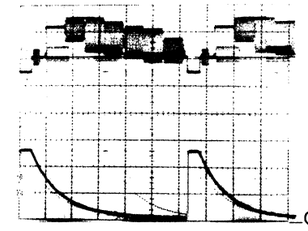


⑨ IC502 Pin 6
Upper ; V : 0.5V/div, H : 2msec/div
Lower ; V : 1V/div, H : 2msec/div

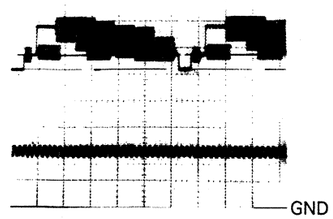


⑩ IC502 Pin 7
V : 1V/div, H : 10μsec/div

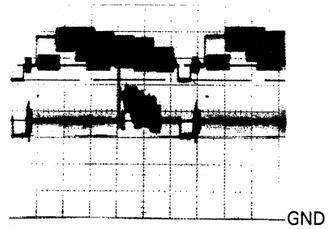
⑪ IC502 Pin 9
V : 1V/div, H : 10μsec/div



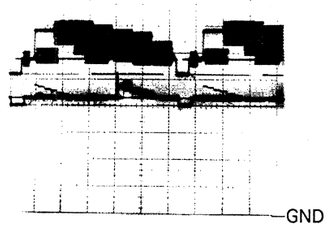
⑫ IC502 Pin 12
V : 1V/div, H : 10μsec/div



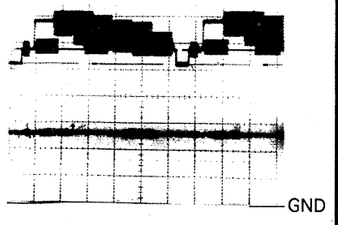
⑬ IC502 Pin 14
V : 0.5V/div, H : 10μsec/div



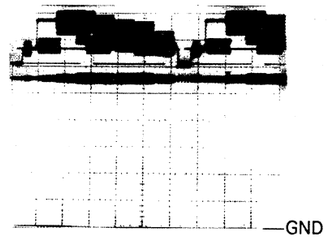
⑭ IC502 Pin 16
V : 0.5V/div, H : 10μsec/div



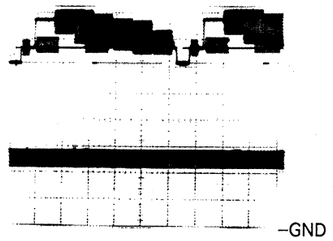
⑮ IC502 Pin 17
V : 1V/div, H : 10μsec/div



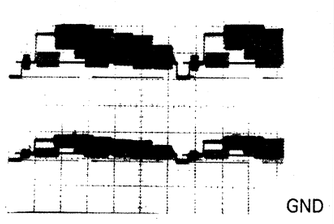
⑯ IC502 Pin 26
V : 0.5V/div, H : 10μsec/div



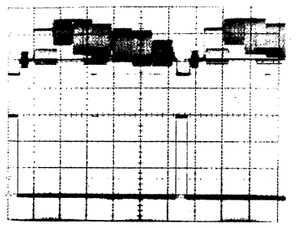
⑰ IC502 Pin 30
V : 1V/div, H : 10μsec/div



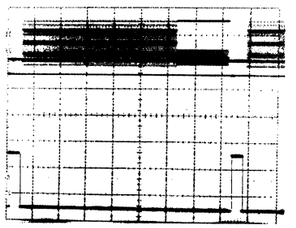
⑱ Q503 Emitter
V : 1V/div, H : 10μsec/div



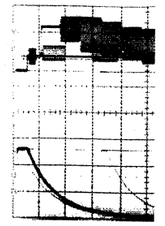
⑳ IC503 Pin 4
V : 2V/div, H : 10μsec/div



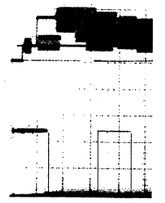
㉑ IC503 Pin 6
Upper ; V : 0.5V/div, H : 2msec/div
Lower ; V : 2V/div, H : 2msec/div



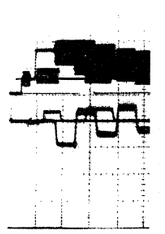
㉓ IC503 Pin 9
V : 1V/div,



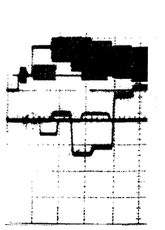
㉔ IC503 Pin 18
V : 2V/div,



㉕ IC503 Pin 19
V : 0.5V/div,



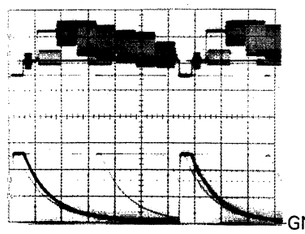
㉖ IC503 Pin 20
V : 0.5V/div,



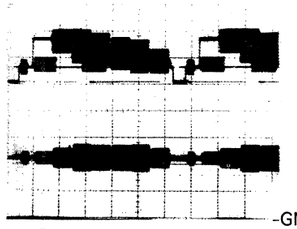
/div

msec/div
msec/div

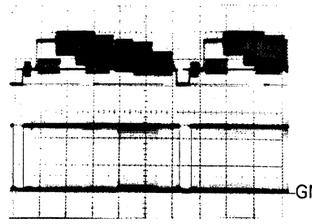
㉓ **IC503 Pin 9**
V : 1V/div, H : 10μsec/div



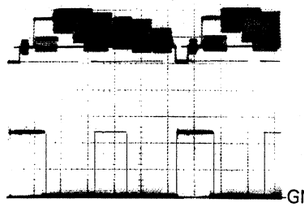
㉗ **IC503 Pin 24**
V : 1V/div, H : 10μsec/div



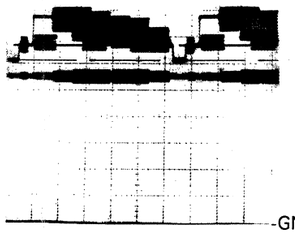
㉛ **IC505 Pin 4**
V : 2V/div, H : 10μsec/div



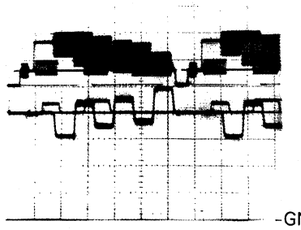
㉔ **IC503 Pin 18**
V : 2V/div, H : 10μsec/div



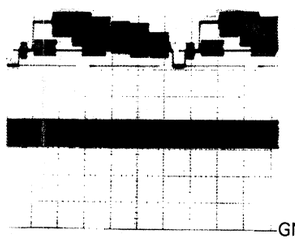
㉘ **IC503 Pin 26**
V : 0.5V/div, H : 10μsec/div



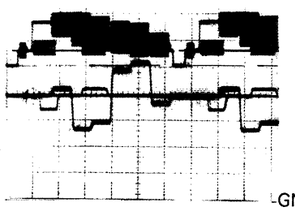
㉕ **IC503 Pin 19**
V : 0.5V/div, H : 10μsec/div



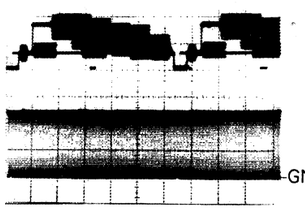
㉙ **IC503 Pin 29**
V : 1V/div, H : 10μsec/div



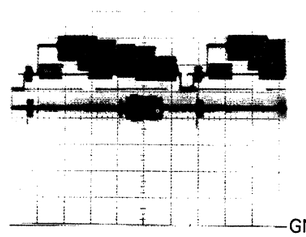
㉖ **IC503 Pin 20**
V : 0.5V/div, H : 10μsec/div



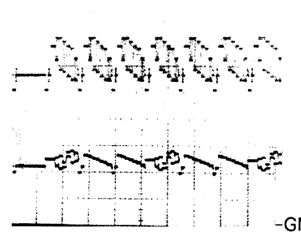
㉝ **IC504 Pin 12**
V : 2V/div, H : 10μsec/div



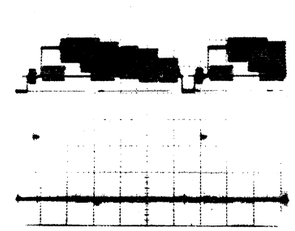
㉞ **IC504 Pin 23**
V : 1V/div, H : 10μsec/div



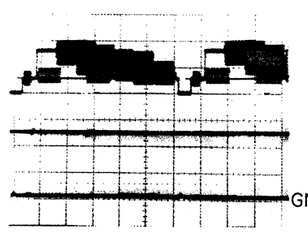
㊳ **IC506 Pin 2**
Upper ; V : 0.5V/div,H : 50μsec/div
Lower ; V : 1V/div,H : 50μsec/div



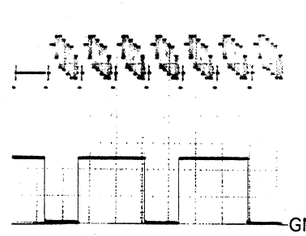
㊷ **IC506 Pin 7**
V : 2V/div, H : 10μsec/div



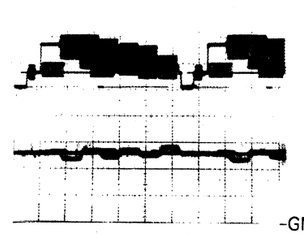
㉟ **IC504 Pin 25**
V : 2V/div, H : 10μsec/div



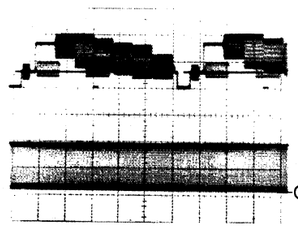
㊴ **IC506 Pin 3**
Upper ; V : 0.5V/div,H : 50μsec/div
Lower ; V : 2V/div, H : 50μsec/div



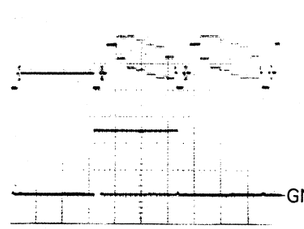
㊸ **IC506 Pin 9**
V : 1V/div, H : 10μsec/div



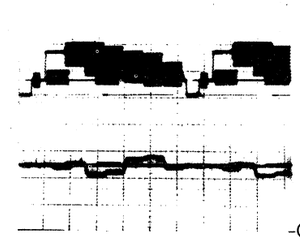
㊱ **IC504 Pin 26**
V : 2V/div, H : 10μsec/div



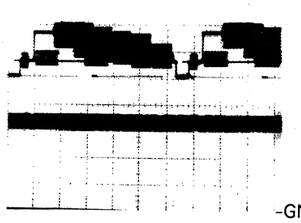
㊵ **IC506 Pin 5**
Upper ; V : 0.5V/div,H : 20μsec/div
Lower ; V : 2V/div, H : 20μsec/div



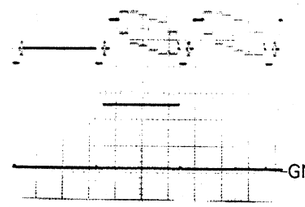
㊹ **IC506 Pin 11**
V : 1V/div, H : 10μsec/div



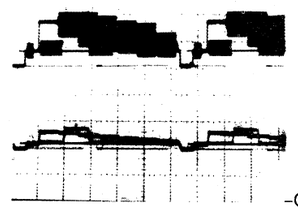
㊲ **IC504 Pin 28**
V : 1V/div, H : 10μsec/div



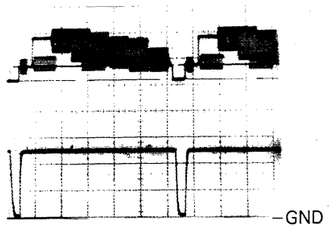
㊶ **IC506 Pin 6**
Upper ; V : 0.5V/div,H : 20 μ sec/div
Lower ; V : 2V/div, H : 20μsec/div



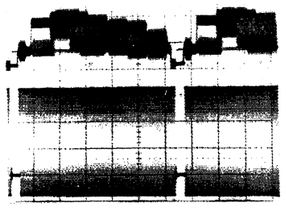
㊺ **IC506 Pin 13**
V : 1V/div, H : 10μsec/div



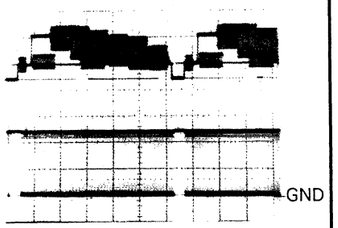
(46) **IC501 Pin 12**
V : 2V/div, H : 10μsec/div



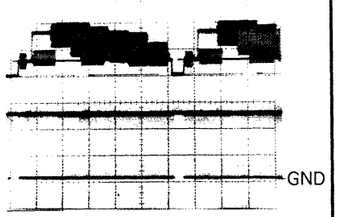
(47) **IC501 Pin 13**
V : 2V/div, H : 10μsec/div



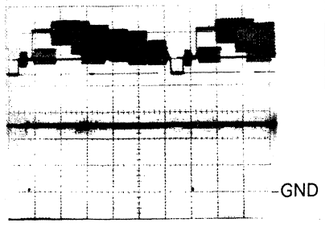
(48) **IC501 Pin 44**
V : 2V/div, H : 10μsec/div



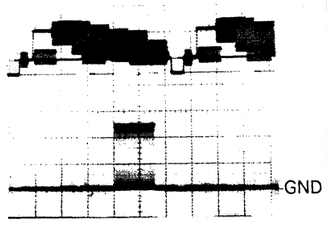
(49) **IC501 Pin 48**
V : 2V/div, H : 10μsec/div



(50) **IC501 Pin 53**
V : 2V/div, H : 10μsec/div

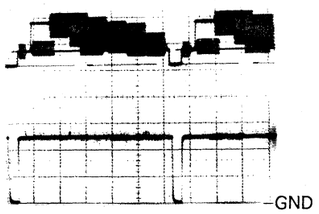


(51) **IC501 Pin 59**
V : 2V/div, H : 10μsec/div

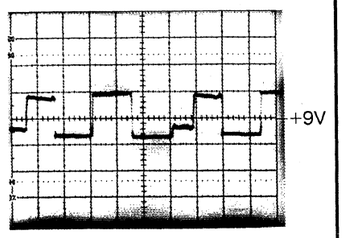


(52) **IC501 Pin 72**
V : 2V/div, H : 10μsec/div

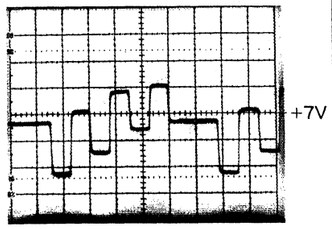
(53) **IC501 Pin 73**
V : 2V/div, H : 10μsec/div



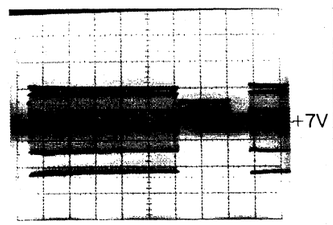
(54) **TP–47R**
V : 1V/div, H : 10μsec/div



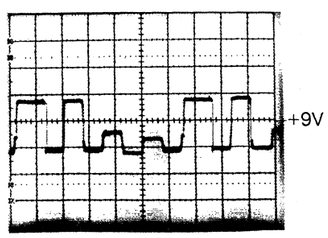
(55) **TP–46B**
V : 1V/div, **H : 10μsec/div**



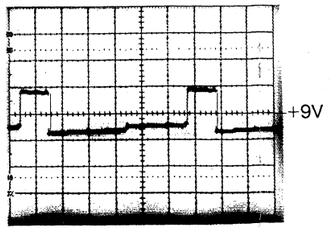
V : 1V/div, **H : 2μsec/div**



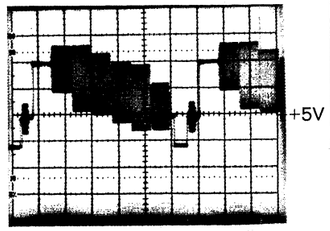
(56) **TP–47B**
V : 1V/div, H : 10μsec/div



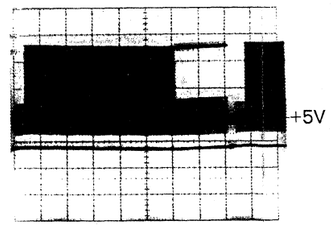
(57) **TP–47G**
V : 1V/div, H : 10μsec/div



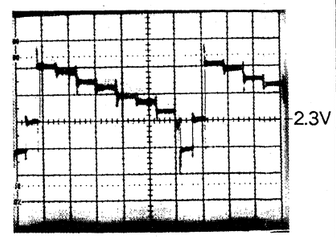
(58) **TP–12**
V : 500mV/div, **H : 10μsec/div**



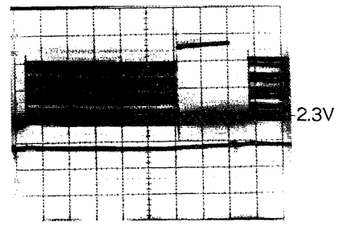
V : 500mV/div, **H : 2mV/div**



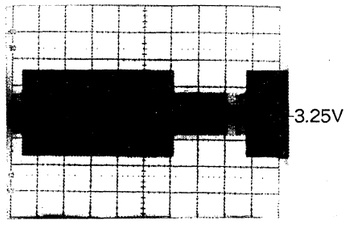
(59) **TP–05**
V : 100mV/div, **H : 10μsec/div**



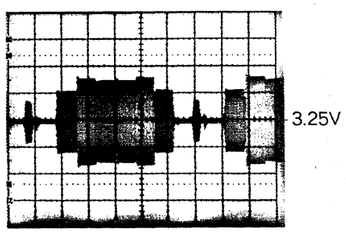
(59) **TP–05**
V : 100mV/div, **H : 2msec/div**



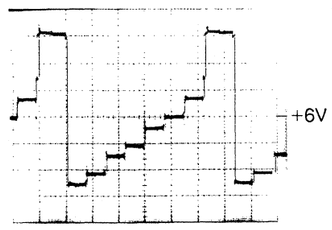
(60) **TP–41**
V : 100mV/div, **H : 2msec/div**



V : 100mV/div, **H : 10μsec/div**

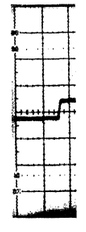


(61) **TP–13**
V : 500mV/div, H : 10μsec/div



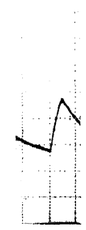
(61) **TP–1**
V : 1V

(62) **TP–4**
V : 1V

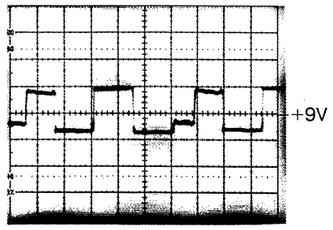


V : 1V

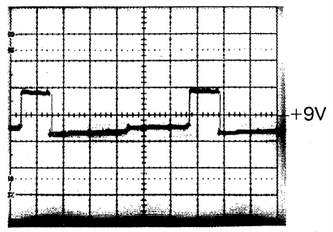
(63) **IC103**
for T
V : 1V



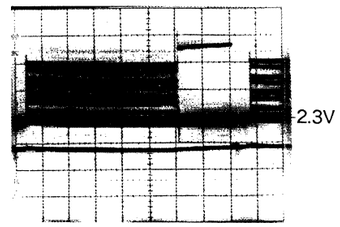
(54) **TP-47R**
V : 1V/div, H : 10μsec/div



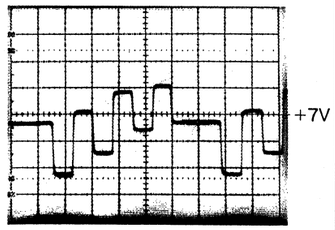
(57) **TP-47G**
V : 1V/div, H : 10μsec/div



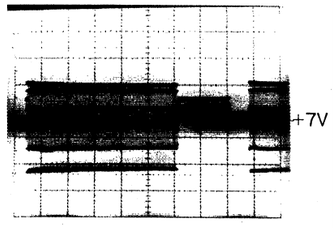
(59) **TP-05**
V : 100mV/div, **H : 2msec/div**



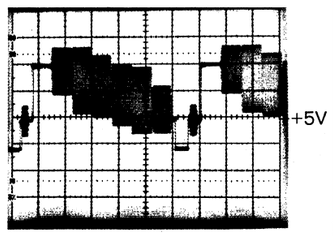
(55) **TP-46B**
V : 1V/div, **H : 10μsec/div**



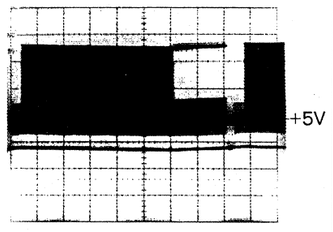
V : 1V/div, **H : 2μsec/div**



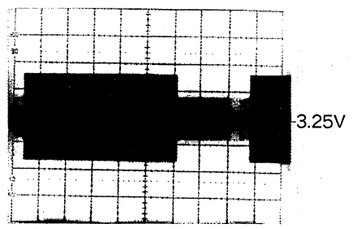
(58) **TP-12**
V : 500mV/div, **H : 10μsec/div**



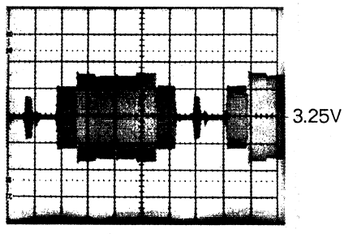
V : 500mV/div, **H : 2mV/div**



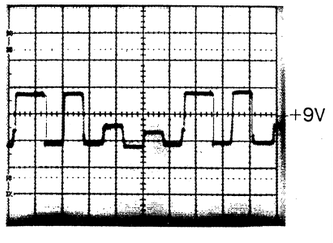
(60) **TP-41**
V : 100mV/div, **H : 2msec/div**



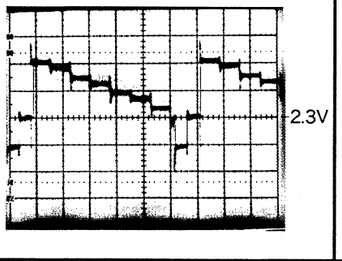
V : 100mV/div, **H : 10μsec/div**



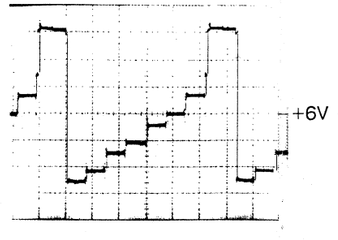
(56) **TP-47B**
V : 1V/div, H : 10μsec/div



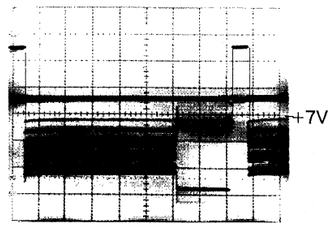
(59) **TP-05**
V : 100mV/div, **H : 10μsec/div**



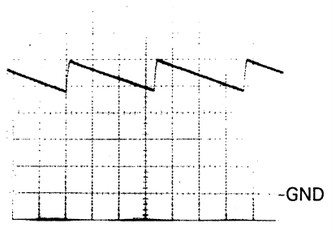
(61) **TP-13**
V : 500mV/div, H : 10μsec/div



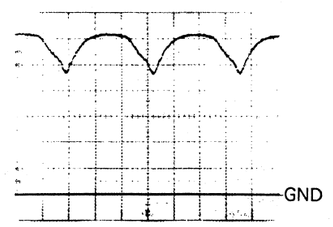
(61) **TP-13**
V : 1V/div, H : 2msec/div



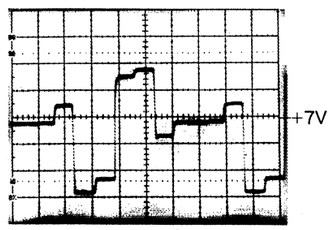
(64) **C681 ⊕ side for TP-604 (V.GND)**
V : 1V/div, H : 5msec/div



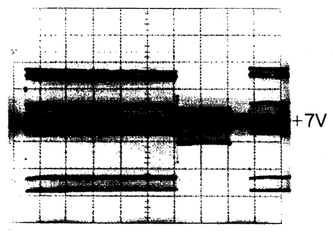
(68) **Q662 Collector for V.GND**
V : 20V/div, H : 5msec/div



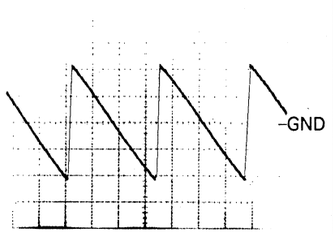
(62) **TP-46R**
V : 1V/div, **H : 10μsec/div**



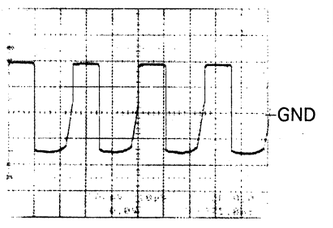
V : 1V/div, **H : 2msec/div**



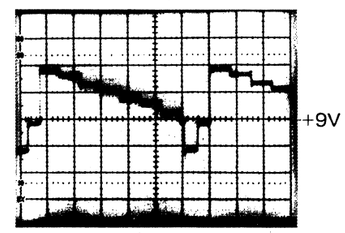
(65) **TP-612 (V.R.M) for TP-605 (V.GND)**
V : 0.5V/div, H : 5msec/div



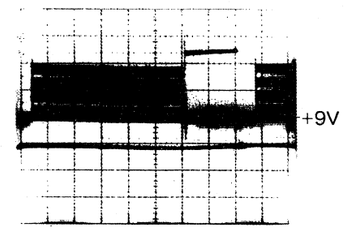
(66) **D655 Cathode**
V : 5V/div, H : 10μsec/div



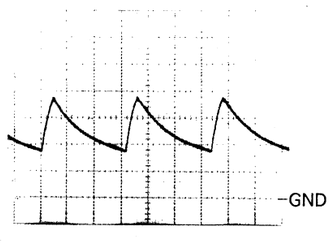
(69) **TP-01**
V : 500mV/div, **H : 10μsec/div**



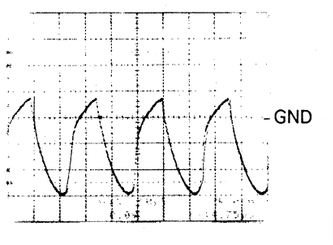
V : 500mV/div, **H : 2msec/div**



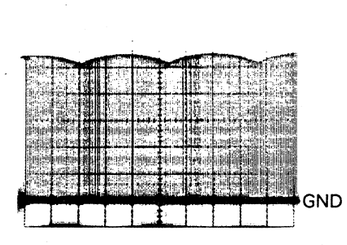
(63) **IC103 Pin 15 for TP-606 (H.GND)**
V : 1V/div, H : 20μsec/div



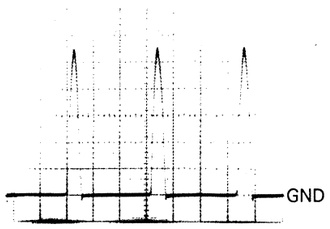
(67) **C719 (both sides)**
V : 2V/div, H : 10μsec/div



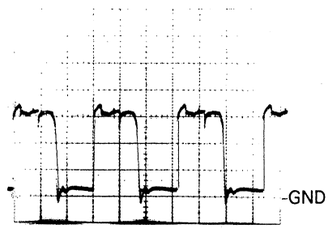
(70) **Q560 Collector for TP-554 (H.GND)**
V : 200V/div, H : 5msec/div



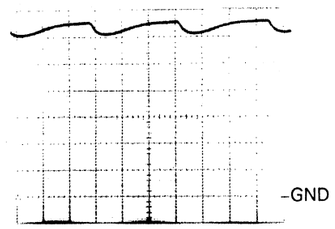
⑦⓪ **Q560 Collector**
for TP-554 (H.GND)
V : 200V/div, H : 20μsec/div



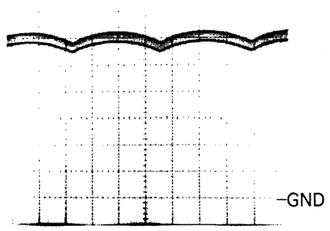
⑦④ **TP-559 (EHT.DRIVE)**
for TP-560 (GND)
V : 0.2V/div, H : 20μsec/div



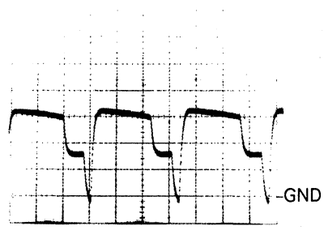
⑦⑦ **TP-602 (+34V)**
for TP-605 (V.GND)
V : 5V/div, H : 5msec/div



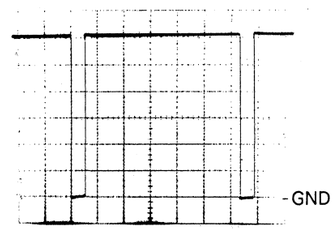
⑦① **TP-553 (H.OUT)**
for TP-554 (H.GND)
V : 20V/div, H : 5msec/div



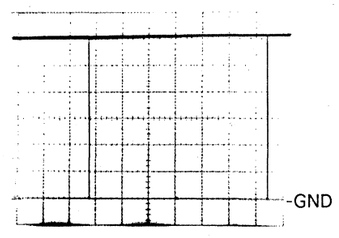
⑦⑤ **TP-555 (VCU)**
for TP-551 (H.GND)
V : 0.5V/div, H : 5msec/div



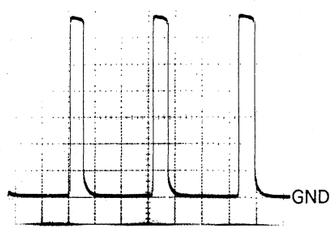
⑦⑧ **TP-C SYNC for TP-GND**
V : 2V/div, **H : 10μsec/div**



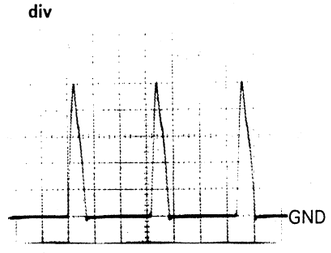
V : 2V/div, **H : 5msec/div**



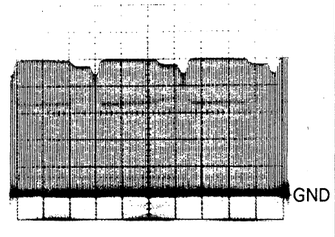
⑦② **TP-552 (H.BLK)**
for TP-551 (H.GND)
V : 2V/div, H : 20μsec/div



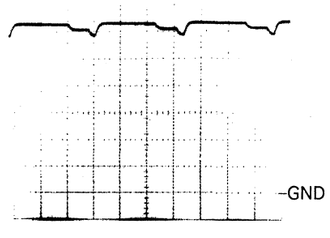
⑦⑥ **Q594 Collector**
for TP-560 (GND)
V : 200V/div, **H : 20μsec/div**



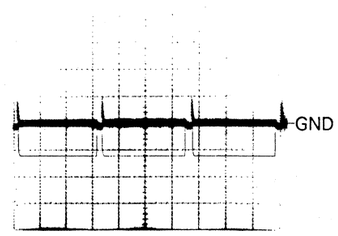
V : 200V/div, **H : 5msec/div**



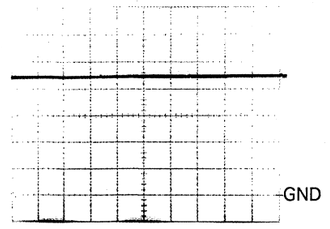
⑦③ **Q595 Emitter**
for TP-560 (GND)
V : 20V/div, H : 5msec/div



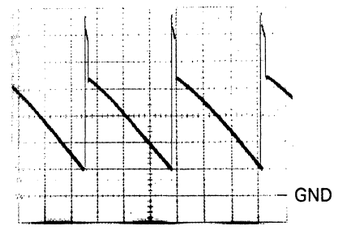
⑦⑨ **TP-608 (AFC)**
for TP-606 (H.GND)
V : 50mV/div, H : 5msec/div
AC range



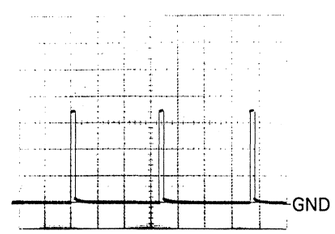
⑦⑨ **TP-608 (AFC)**
for TP-606 (H.GND)
V : 1V/div, H : 5msec/div



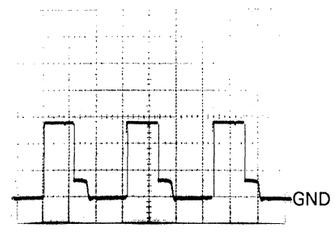
⑧③ **TP-609 (V. OUT)**
for TP-605 (V.GND)
V : 5V/div, H : 5msec/div



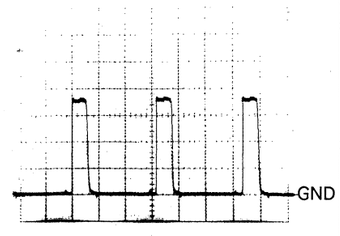
⑧⓪ **TP-607 (V. BLK)**
for TP-604 (V.GND)
V : 2V/div, H : 5msec/div



⑧① **TP-611 (DRIVE)**
for TP-606 (H.GND)
V : 1V/div, H : 20μsec/div



⑧② **TP-610 (H. BLK)**
for TP-606 (H.GND)
V : 0.5V/div, H : 20μsec/div



iv

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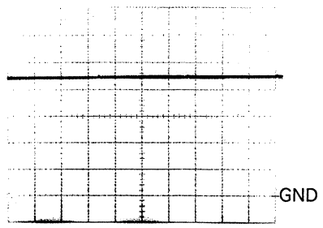
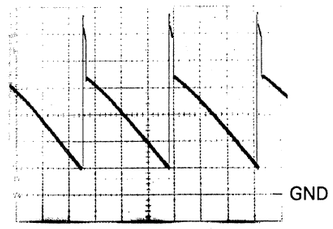
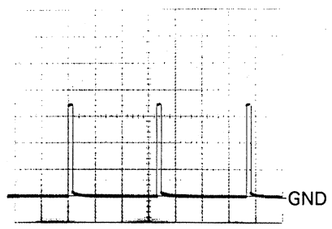
⑦⑨ **TP−608 (AFC)**
for TP−606 (H.GND)
V : 1V/div, H : 5msec/div



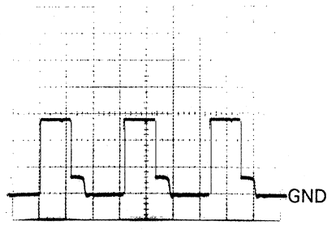
⑧③ **TP−609 (V. OUT)**
for TP−605 (V.GND)
V : 5V/div, H : 5msec/div



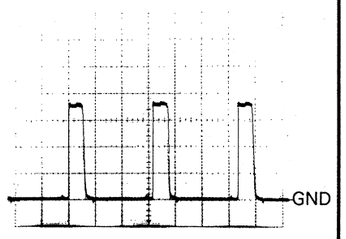
⑧⓪ **TP−607 (V. BLK)**
for TP−604 (V.GND)
V : 2V/div, H : 5msec/div

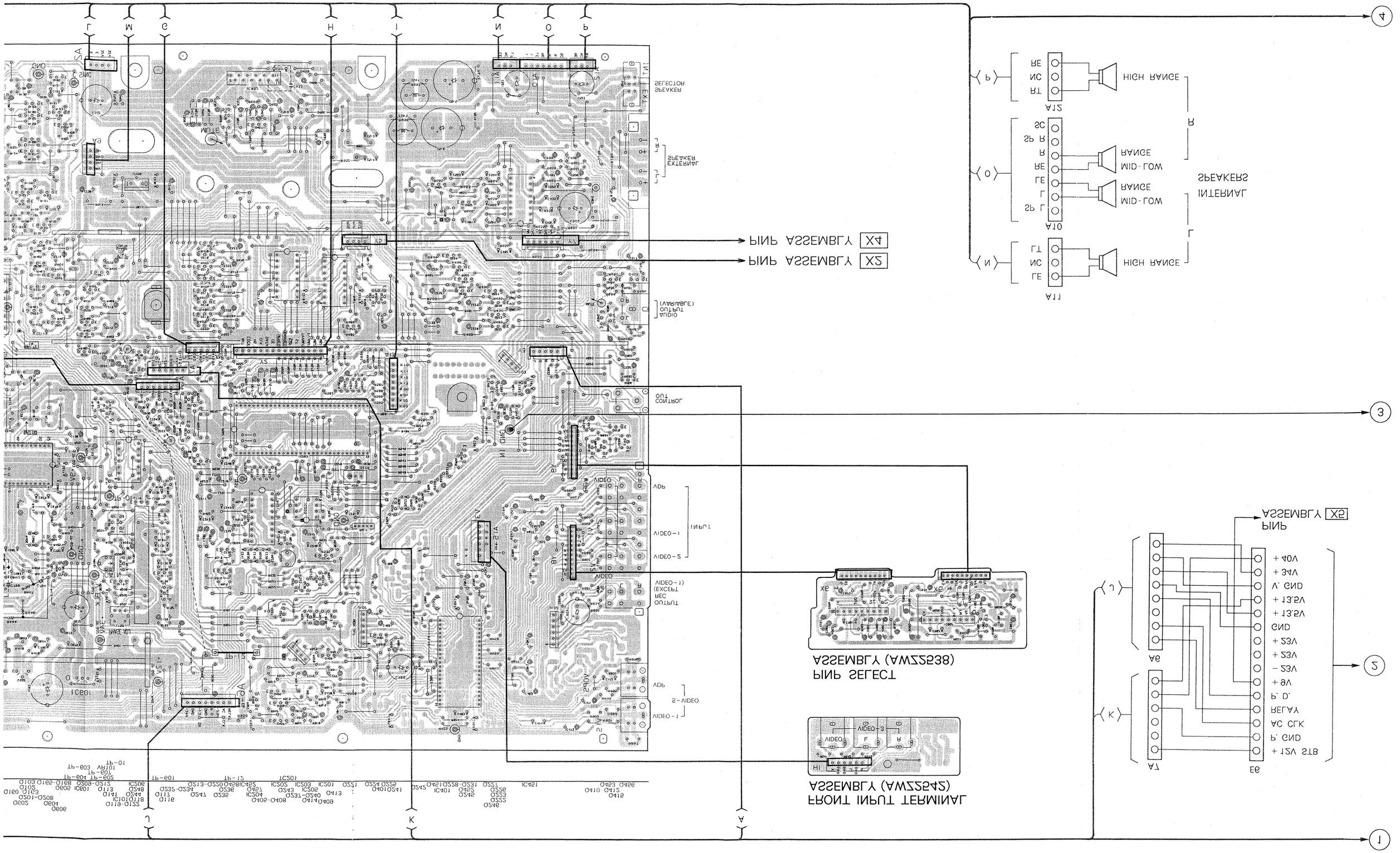


⑧① **TP−611 (DRIVE)**
for TP−606 (H.GND)
V : 1V/div, H : 20μsec/div



⑧② **TP−610 (H. BLK)**
for TP−606 (H.GND)
V : 0.5V/div, H : 20μsec/div




SPEAKERS
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RANGE
MID-LOW
RANGE
MID-LOW
HIGH RANCE
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AT10
AT11
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L
ASSEMBLY (AW22928)
PIN SELECT
ASSEMBLY (AW22945)
FRONT INPUT TERMINAL
ASSEMBLY [X2]
PIN
ASSEMBLY [X4]
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SPEAKER EXTERNAL
OUT CONTROL
AUDIO (VARIABLE) OUTPUT
S-VIDEO
VIDEO-1
INPUT
VIDEO-1 (EXCEPT REC OUTPUT)
VIDEO
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FRONT CONTROL ASSEMBLY (AWZ5259)

RECEIVER ASSEMBLY (AWZ5241)

VIDEO/AUDIO ASSEMBLY (AWV1019)

TUNER ASSEMBLY (AWF1138)

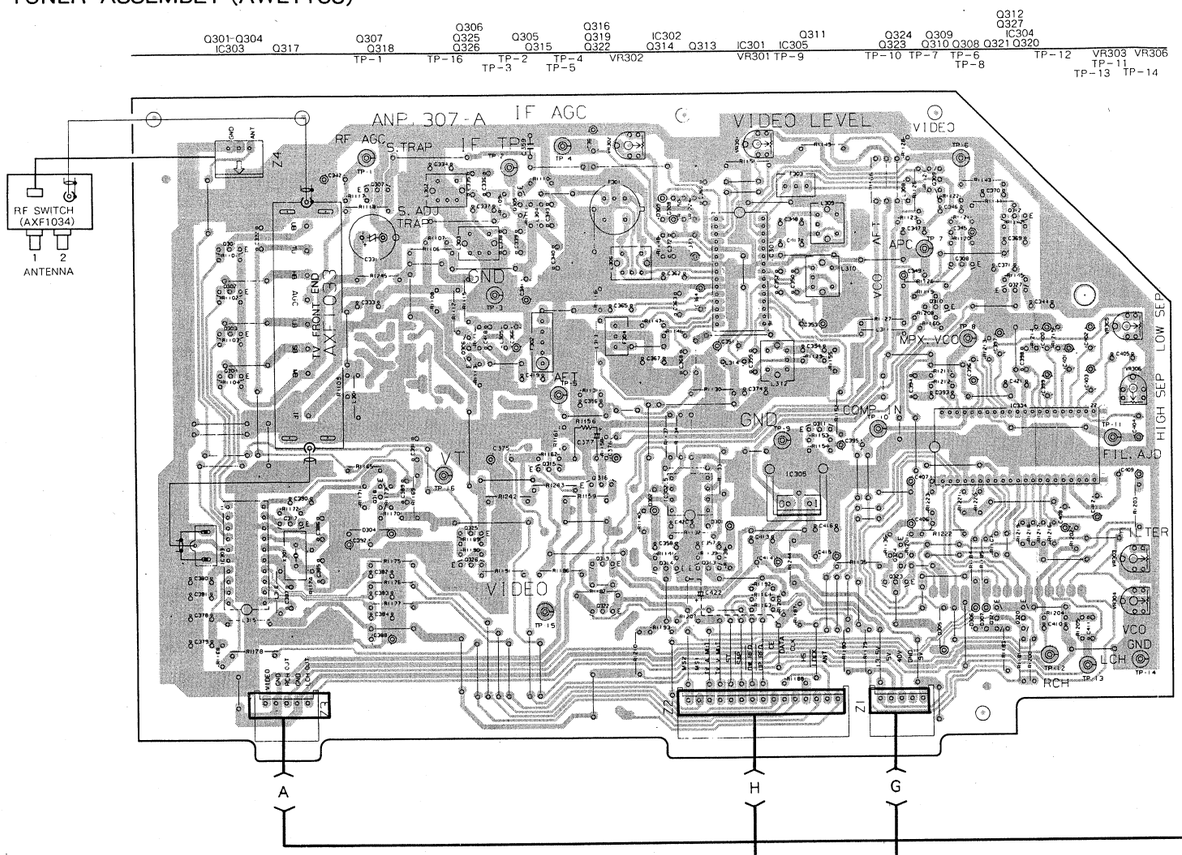
This P.C.B. connection diagram is viewed from the foil side.

P.C.B. BOARD PATTERN **E.S**

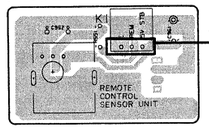
SD-P5035-C

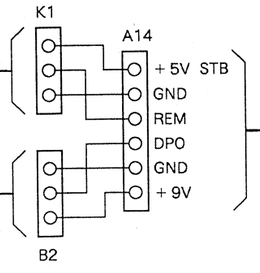
8.9 P.C. BOARDS PATTERN

TUNER ASSEMBLY (AWE1135)

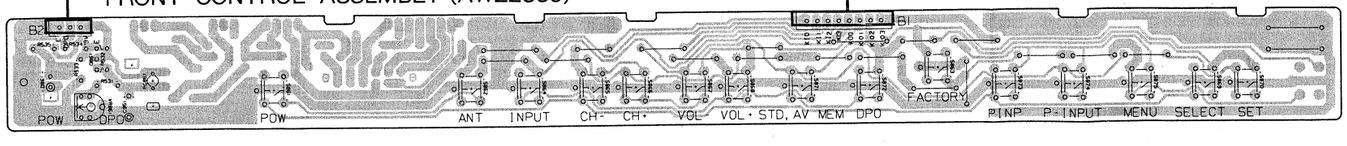


RECEIVER ASSEMBLY (AWZ2541)

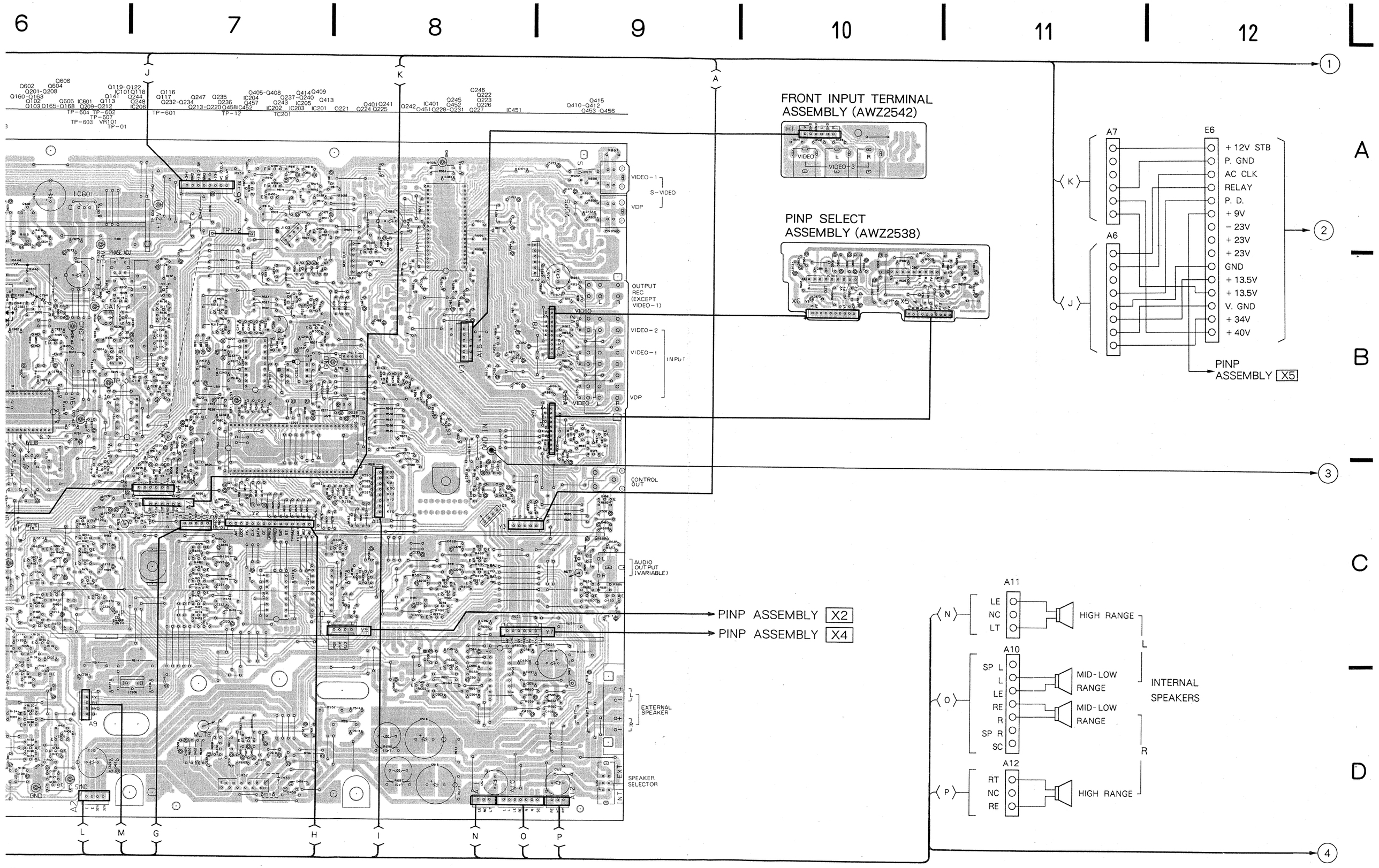


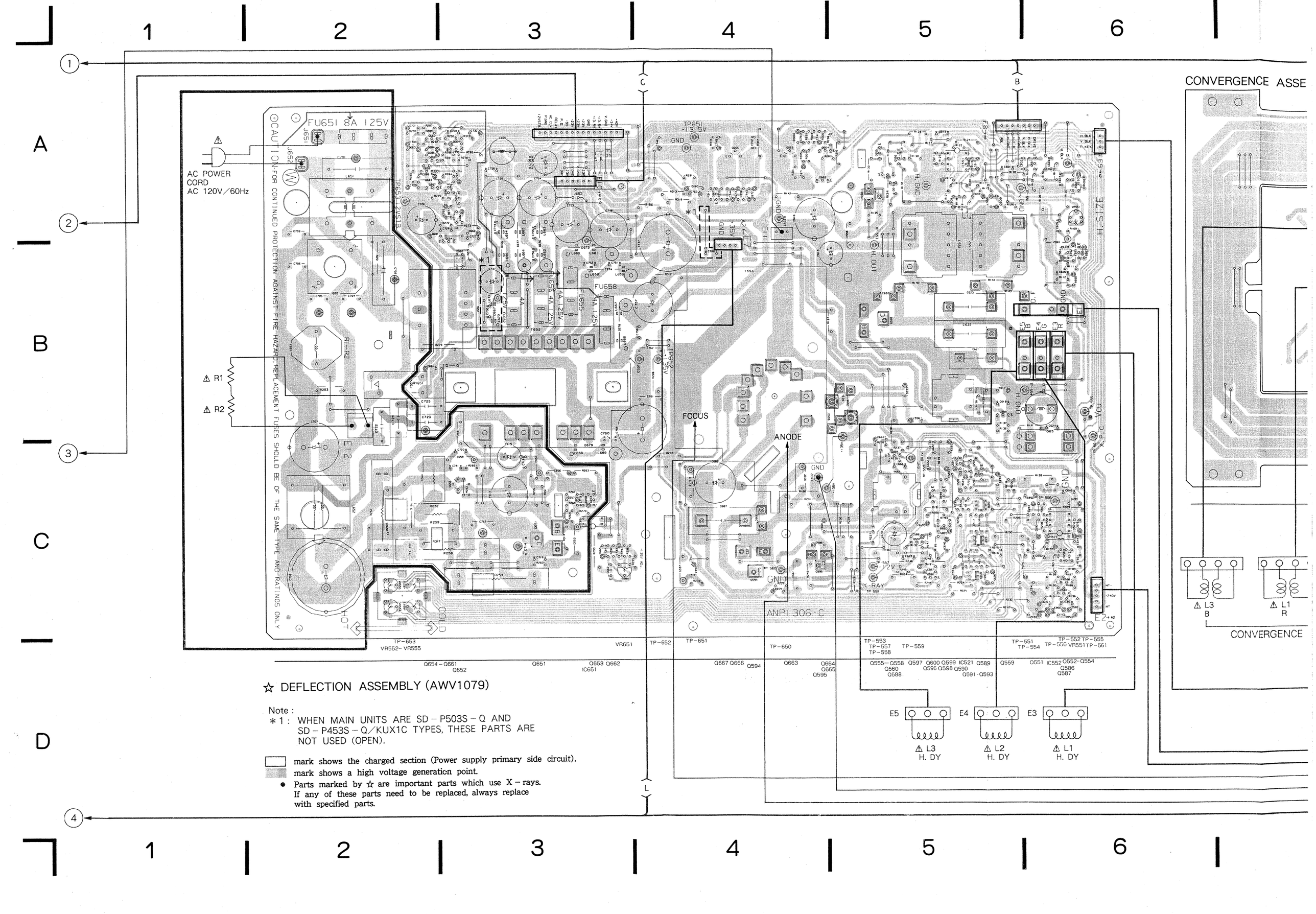


FRONT CONTROL ASSEMBLY (AWZ2539)



VIDEO/AUDIO ASSEMBLY (AWV1076)


FRONT INPUT TERMINAL ASSEMBLY (AWZ2542)
PINP SELECT ASSEMBLY (AWZ2538)
A7
E6
+ 12V STB
P. GND
AC CLK
RELAY
P. D.
+ 9V
– 23V
+ 23V
+ 23V
GND
+ 13.5V
+ 13.5V
V. GND
+ 34V
+ 40V
A6
PINP ASSEMBLY X5
VIDEO – 1
S – VIDEO
VDP
OUTPUT REC (EXCEPT VIDEO – 1)
VIDEO – 2
VIDEO – 1
INPUT
VDP
CONTROL OUT
PINP ASSEMBLY X2
PINP ASSEMBLY X4
AUDIO OUTPUT (VARIABLE)
EXTERNAL SPEAKER
SPEAKER SELECTOR
A11
LE
NC
LT
HIGH RANGE
A10
SP L
L
LE
RE
R
SP R
SC
MID – LOW RANGE
MID – LOW RANGE
INTERNAL SPEAKERS
A12
RT
NC
RE
HIGH RANGE



☆ DEFLECTION ASSEMBLY (AWV1079)

Note :

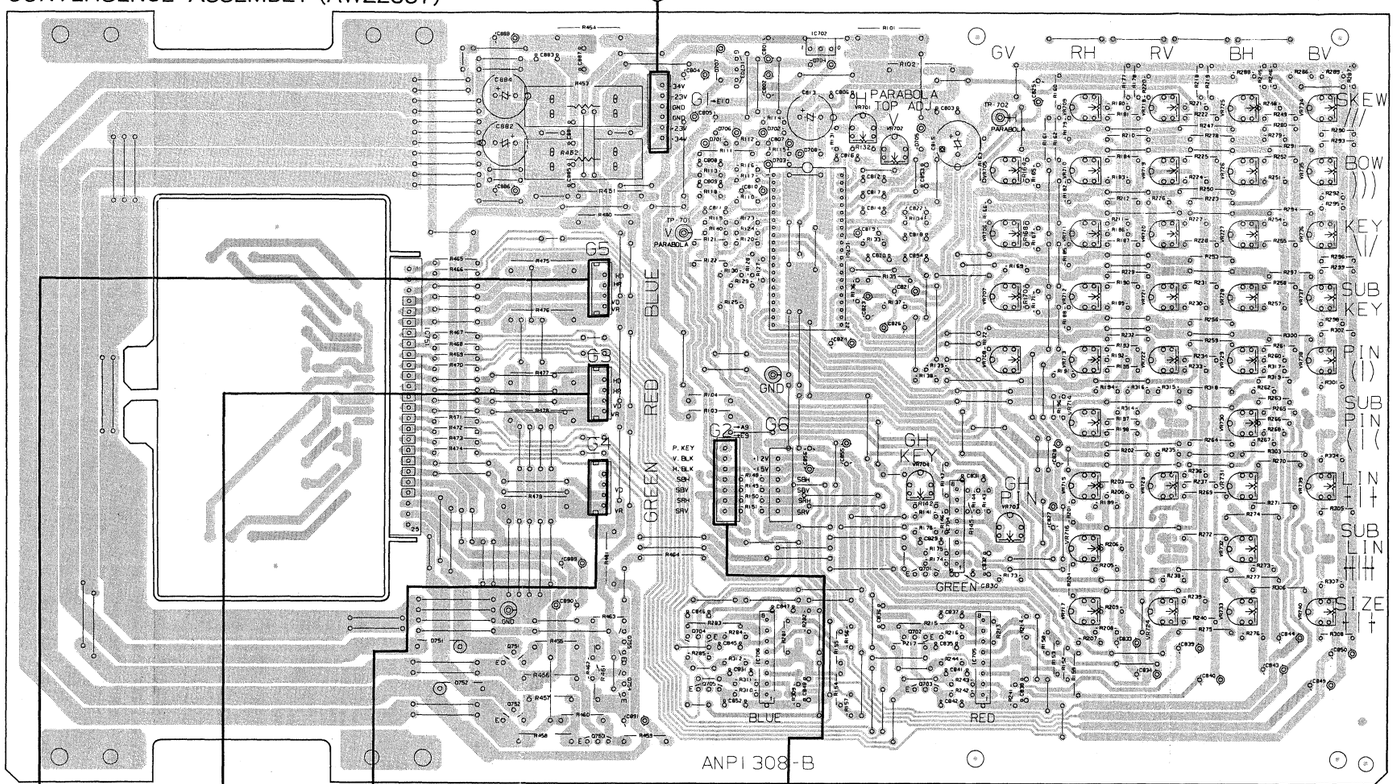
*1 : WHEN MAIN UNITS ARE SD-P503S-Q AND SD-P453S-Q/KUX1C TYPES, THESE PARTS ARE NOT USED (OPEN).

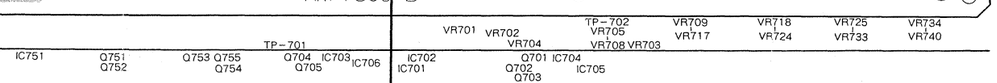
▭ mark shows the charged section (Power supply primary side circuit).

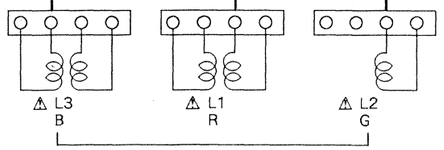
▭ mark shows a high voltage generation point.

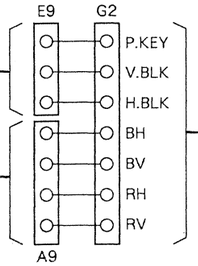
● Parts marked by ☆ are important parts which use X-rays. If any of these parts need to be replaced, always replace with specified parts.

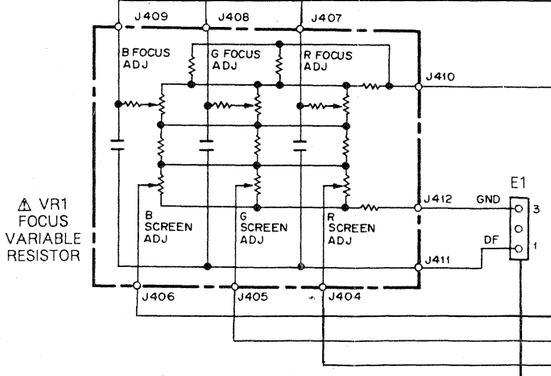
CONVERGENCE ASSEMBLY (AWZ2537)

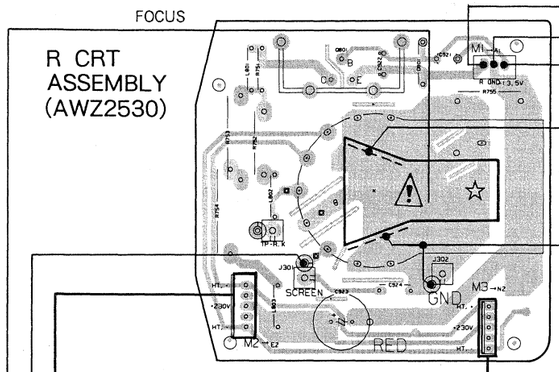


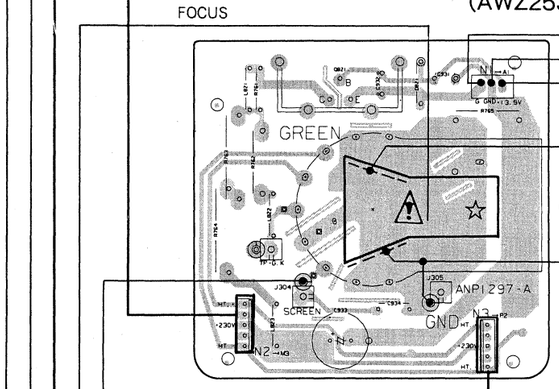


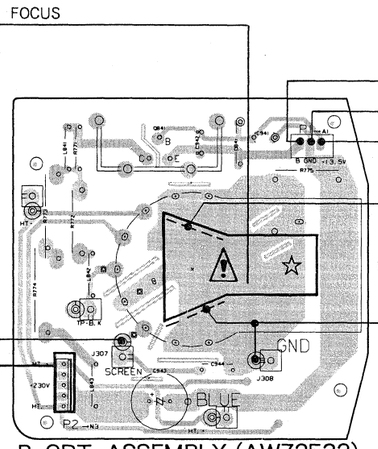




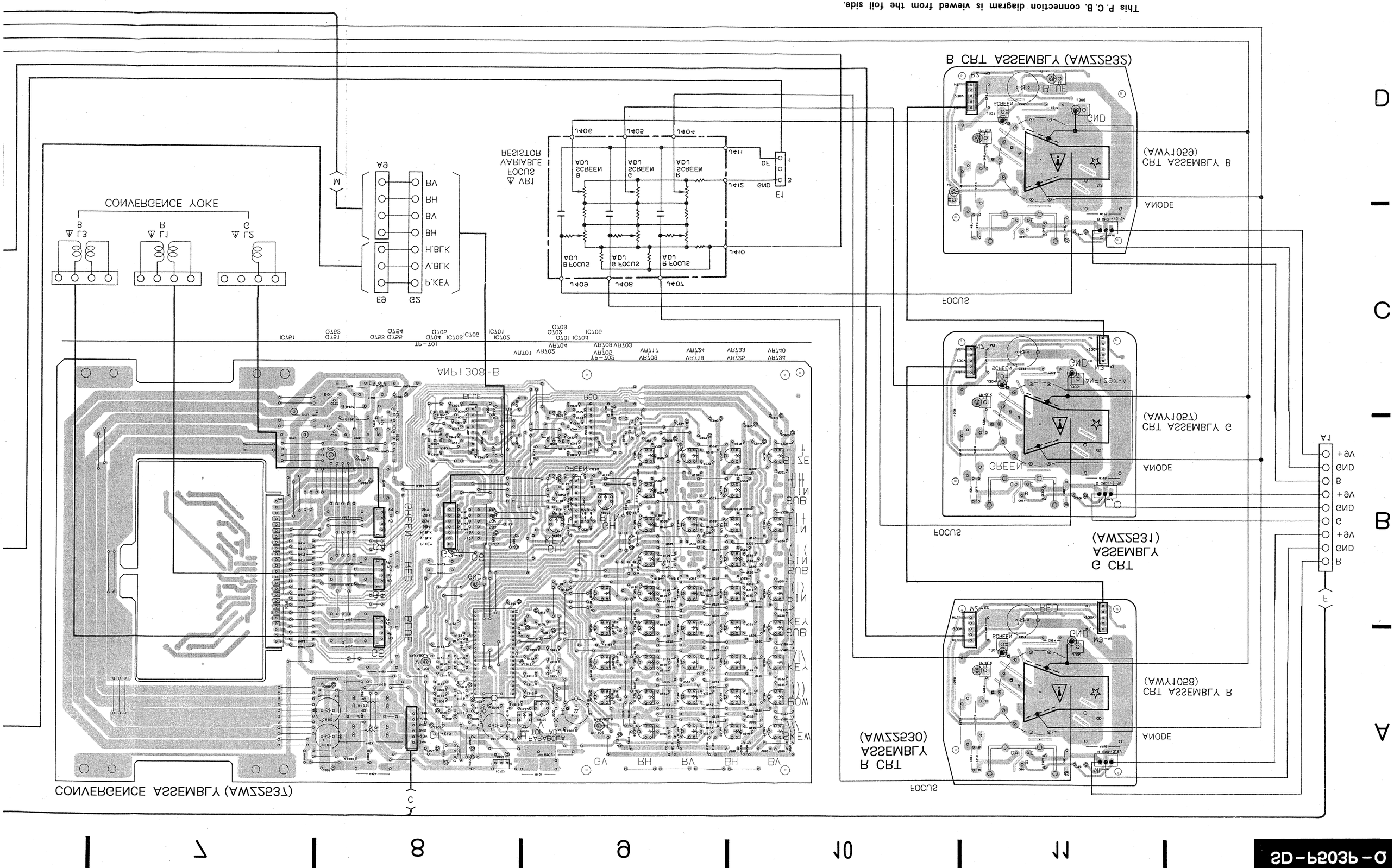


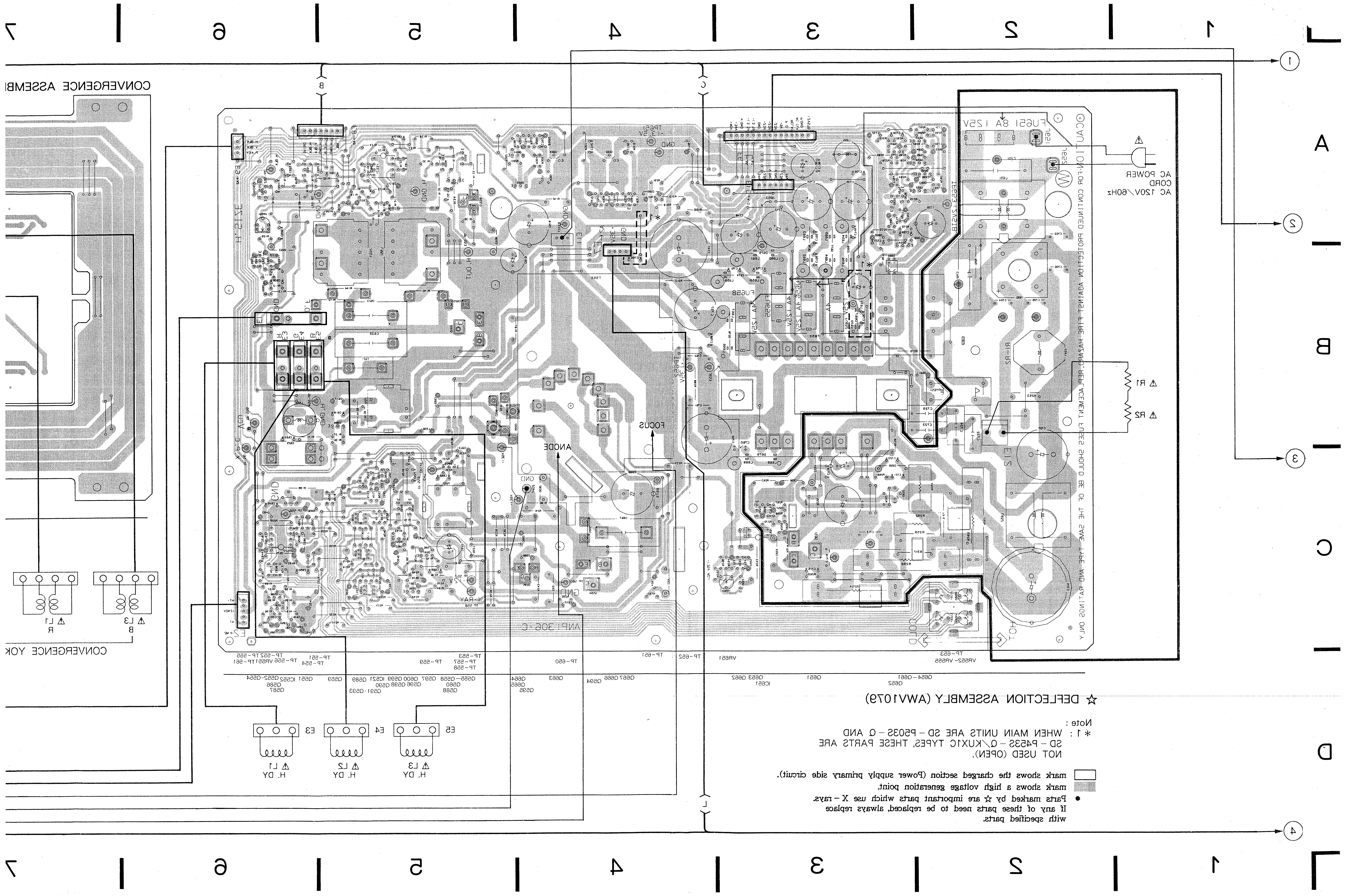






This P.C.B. connection diagram is viewed from the foil side.



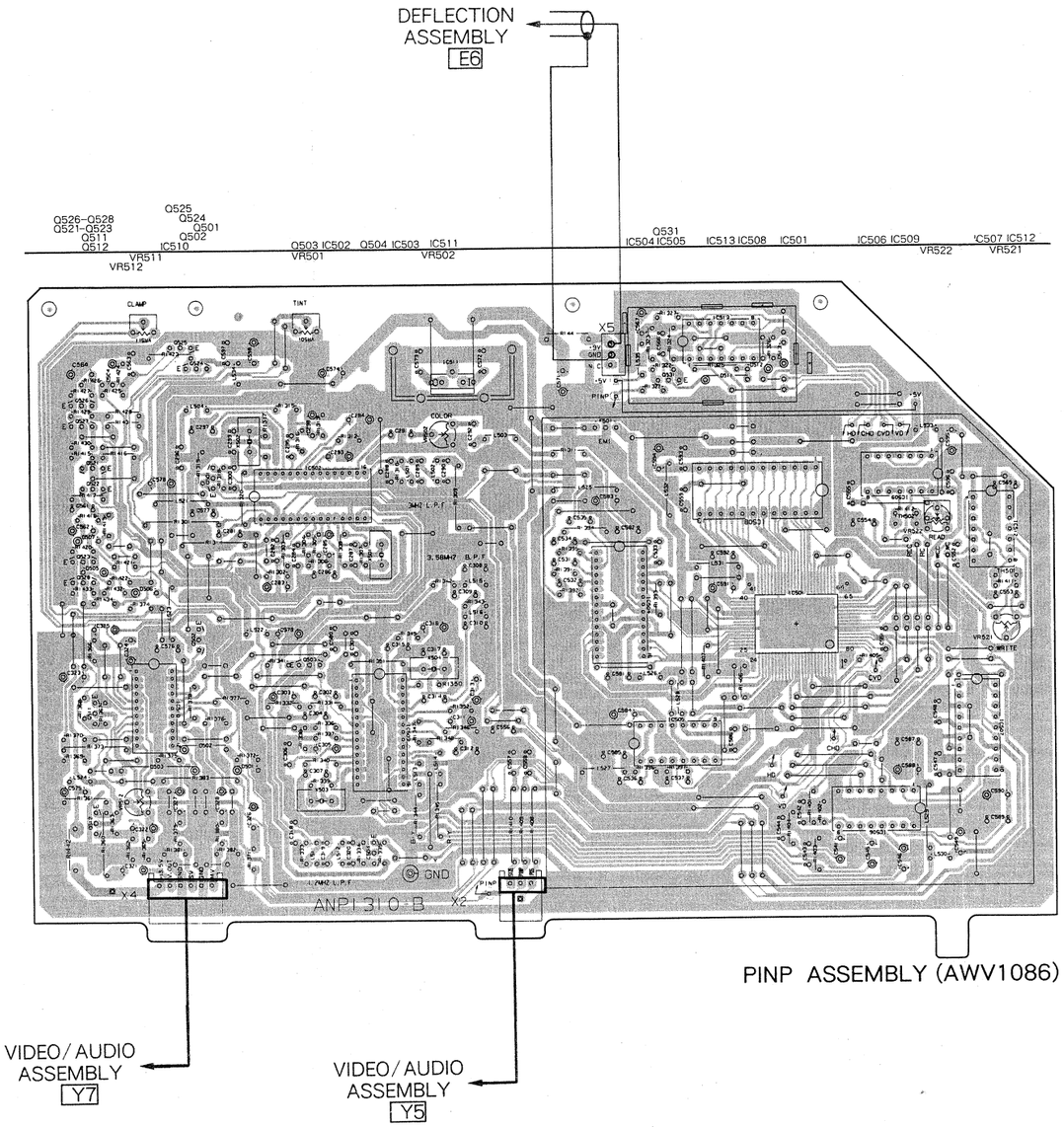


☆ DEFLECTION ASSEMBLY (AWV1079)

Note :

* 1 : WHEN MAIN UNITS ARE SD-P5035-Q AND SD-P4535-Q/KUX1C TYPES, THESE PARTS ARE NOT USED (OPEN).

- mark shows the charged section (Power supply primary side circuit).
- mark shows a high voltage generation point.
- Parts marked by ☆ are important parts which use X-rays. If any of these parts need to be replaced, always replace with specified parts.



NOTE

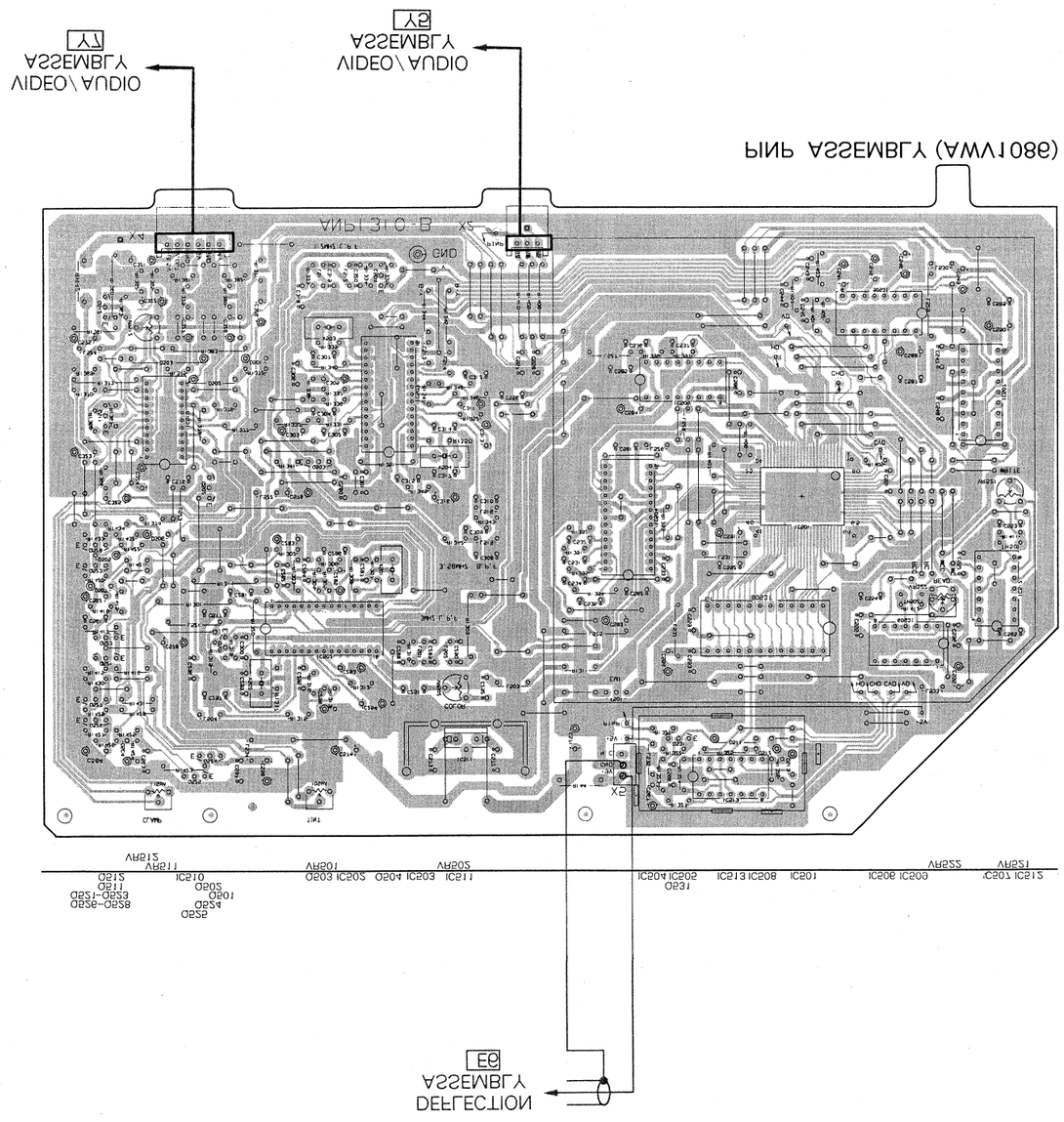
1. This P.C.B connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the following Table.

P.C.B. pattern diagram indication	Corresponding part symbol	Part Name
Q504 (E)	(E) or (E)	Transistor
Q215	or	Radiator type transistor
D203	D203	Diode
R237	R237	Resistor
C513	+	Capacitor (Polarity)
C518		Capacitor (Non-polarity)

Others

P.C.B. pattern diagram indication	Part Name
IC	IC
S	Switch
RY	Relay
L	Coil
F	Filter
VR	Variable resistor or Semi-fixed resistor

3. The capacitor terminal marked with ⓞ (double circles) shows negative terminal.
4. The diode terminal marked with ⓞ (double circles) shows cathode side.
5. The transistor terminal to which E is affixed shows the emitter.



This P.C.B. connection diagram is viewed from the foil side.

9. ADJUSTMENT

- Adjustment items are described as follows.

9.1 When TUNER assembly is repaired.
9.2 When TUNER assembly is replaced.
9.3 When VIDEO/AUDIO assembly is repaired.
  9.3.1 Video section.
  9.3.2 Microcomputer section.
9.4 When VIDEO/AUDIO assembly is replaced.
  9.4.1 Video section.
  9.4.2 Microcomputer section.
9.5 When DEFLECTION assembly is repaired.
  9.5.1 Power supply section.
  9.5.2 Deflection section.
9.6 When DEFLECTION assembly is replaced.
  9.6.1 Power supply section
  9.6.2 Deflection section.
9.7 When CONVERGENCE assembly is repaired or replaced.
9.8 When FRONT CONTROL assembly is repaired.
9.9 When FRONT CONTROL assembly is replaced.
9.10 When R, G or B CRT assembly is repaired or replaced.
9.11 When CRT assembly R, G or B is replaced.
9.12 When lens assembly is replaced.
9.13 When PINP assembly is repaired.
9.14 When PINP assembly is replaced.
9.15 When SURROUND assembly is repaired.
9.16 When SURROUND assembly is replaced.
9.17 When other assemblies are repaired or replaced.
9.18 DPO level setting.
9.19 DPO sensitivity adjustment.
9.20 Anode cable connection and disconnection.

- These adjustment procedures are described separately for adjustments following assembly exchange and adjustments following repairs.
- When replacing the assemblies, always use recommended replacements.
- Symbols in parentheses next to the adjustment position ( ) indicate denotes the relevant assembly to be adjusted.
  V : VIDEO/AUDIO assembly
  C : CONVERGENCE assembly
  F : FRONT CONTROL assembly
  D : DEFLECTION assembly
  T : TUNER assembly
  VR : Focus variable resistor (VR1)
- The adjustment points and TP terminals on the each assemblies are shown in Fig. 9-7 thru 9-10.
  Fig. 9-7 : VIDEO/AUDIO assembly, TUNER assembly, PINP assembly, SURROUND assembly, rear panel and DEFLECTION assembly.
  Fig. 9-8 : Front panel, FRONT CONTROL assembly, CONVERGENCE assembly and focus variable resistor.
  Fig. 9-9 : B CRT assembly, G CRT assembly and deflection yoke.
  Fig. 9-10 : Lens assembly (Red, Green, Blue).
- Set the input terminals at the rear panel as follows unless otherwise noted.
  VIDEO signal : INPUT VDP VIDEO terminal
  AUDIO signal : INPUT VDP AUDIO terminal
- Set the picture quality to standard (screen displayed "STD") by remote control unit unless otherwise noted.

9.1 WHEN TUNER ASSEMBLY IS REPAIRED

- Connection diagram is refered to Fig. 9-1.
- Adjustment points and test points (TP) are shown in Fig. 9-7-2.
- Perform the adjustment set to the TEST mode (Note 1).
- Perform the adjustment by using the channel 9 unless otherwise noted.
- Video and audio input signals are described in the below.

Video signal
V① ; fv = EIA color bar, 60dBμV
Ⓝ ; No signal (No carrier)
Audio signal (MONO)
S① ; f_A = 1kHz, 100% MOD, 54dBμV
Audio signal (STEREO) ; dbx noise reduction ON, PRE-EMPHASIS ON
S② ; f_A = 300Hz, 30% MOD, Lch (or Rch) only, 54dBμV
S③ ; f_A = 5kHz, 30% MOD, Lch (or Rch) only, 54dBμV
Signal for trap adjustment
T① ; 53.75MHz, unmodulated, 54dBμV
T② ; 59.75MHz, unmodulated, 54dBμV

Note 1 ;

How to set the TEST mode.
- Short-circuit PLL TEST TP and GND in the VIDEO/AUDIO assembly. (Fig. 9-7-3)
- Disconnect the AC power cord from the AC outlet, then connect it again.

How to release the TEST mode.
- Release the short-circuit PLL TEST TP and GND in the VIDEO/AUDIO assembly.
- Disconnect the AC power cord from the AC outlet, then connect it again.

Video System

Step No.	Adjustment item	Input signal		Adjustment point	Adjustment procedure
		Video	Audio		
1	Adjacent audio trap	2 ch Ⓝ	T①	L302 (T)	Adjust TP-2 47.25MHz component to minimum level.
2	Audio trap	2 ch Ⓝ	T②	L303 (T)	Adjust TP-2 41.25MHz component to minimum level.
3	Synchronous detection	V①	S①	—	Short TP-4 to GND, and measure TP-7 voltage.
4				L310 (T)	Open TP-4, and adjust the TP-7 voltage to the voltage measured in step 3.
5	RF AGC			VR302 (T)	Adjust the TP-1 voltage to 6.5V.
6	AFT			L309 (T)	Adjust the TP-5 voltage to 4.5V.
7	VIDEO output			VR301 (T)	Adjust the output level of the OUTPUT REC (EXCEPT VIDEO 1) terminal on the rear panel to 1Vp-p when that terminal is terminated by 75 ohms.

Audio System

Step No.	Adjustment item	Input signal		Adjustment point	Adjustment procedure
		Video	Audio		
1	Audio detection	V①	S①	L312 (T)	Adjust the distortion of the AUDIO OUTPUT terminal on the rear panel to minimum level.
2	dbx filter	Ⓝ	Ⓝ	VR303 (T)	Input the signal of 22.9kHz/245mV to TP-10, and adjust TP-11 output to minimum.
3	VCO	Ⓝ	Ⓝ	—	Measure the DC voltage of TP-8 with no input signal.
4		Ⓝ	Ⓝ	VR304 (T)	Input the signal of 15.734kHz/48mV to TP-10, and adjust the DC voltage of TP-8 to the voltage measured in step 3.
5	Separation	V①	S②	VR305 (T)	Adjust the output of the AUDIO OUTPUT terminal on the rear panel to minimum level.
6			S③	VR306 (T)	
7	Repeat steps 5 and 6 to obtained best separation.				

9.2 WHEN TUNER ASSEMBLY IS REPLACED

● No adjustment required.

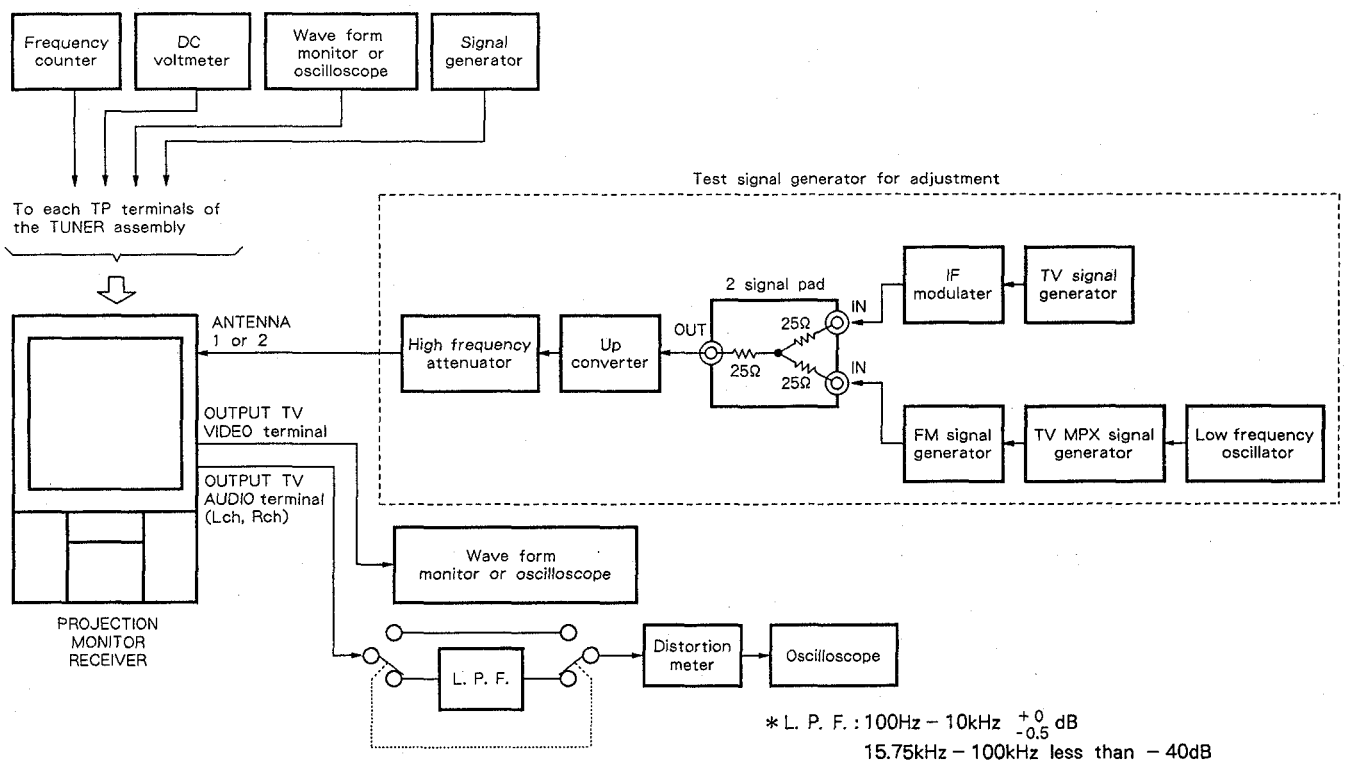


Fig. 9-1 Connection diagram when adjusting the tuner section

9.3 WHEN VIDEO/AUDIO ASSEMBLY IS REPAIRED

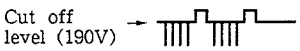
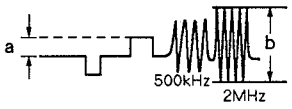
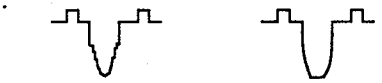
9.3.1 Video section

● Adjustment test points (TP) are located in the VIDEO/AUDIO assembly unless otherwise noted (Refer to Fig. 9-7-3).

Step No.	Adjustment item	Input signal	Adjustment point	Adjustment procedure
1	Comb filter adjustment	Color bar	VR101, L150 (V)	Adjust TP-01 3.58MHz component to minimum level.
2	White balance adjustment	Color bar signal without color signal	Screen VR (R),(B) (VR1) VR102 (R) / VR105 (B) Drive VR (V)	Adjust the screen VRs (R) and (B) until grey color can just be seen in the color of dark area. (Do not move the green VR at this stage.) Using the drive VR, adjust the color of bright area to white.

9.3.2 Microcomputer section

- Set to the FACTORY ADJ. MODE. (＊2)
- The ＊1 mark in the adjustment description means that the corresponding adjustment should be effectuated with the remote control unit in the same way as the adjustment by the user.

Step No.	Adjustment item		Input signal	Adjustment point	Adjustment procedure
1	PIONEER Standard setting	Brightness adjustment	—	Color (＊1)	Minimize Color by remote control.
2			Cross hatch signal	Brightness (＊1)	Adjust the cut off level at TP-GK of G. CRT assembly to 190V. (After adjustment, confirm the white balance.)  (After this adjustment, adjust color as described in step No. 4).
3		Sharpness adjustment	Multi burst	Sharpness (＊1)	At TP-05, set the rate of b (peak-to-peak value at 2MHz) to a (level from black to white) as follows. a : b = 3 : 9.5 (+ 10dB) 
4		Color adjustment	Color bar	Color (＊1)	Adjust screen to optimum condition.
5		Tint adjustment		Tint (＊1)	Adjust screen to optimum condition.
6		Contrast adjustment		Contrast (＊1)	Adjust screen to optimum condition.
7			Free signal	—	At the TP-BK of B. CRT assembly, confirm that the signal is shaped as shown below. 
8	Turn the FACTORY ADJ. MODE switch (S863) off to the normal mode. (＊2)				
9	Blue tailing adjustment		Cross signal	—	Adjust the SG output of the input cross signal to maximum level.
					Maximize contrast by remote control.
				VR107 (V)	Turn VR107 fully counter clockwise (resulting in blue tailing.).
					Turn the VR clockwise until there is no blue tailing at the vertical cross line on the screen.
10	Press the FACTORY ADJ. MODE ON/OFF switch (S863) twice so that the test cross signal is reset to the default status. Pressing the switch twice will enter the FACTORY ADJ. MODE, and then the normal mode.				
11	Test cross H. center position		Signal with synchronizing signal meaning	TC201 (V)	Generate test cross signal, and adjust to center of screen.
12	DPO level adjustment		This adjustment only needs to be carried out if IC205 (M6M80011AP) is replaced or if the DPO preset level is changed when a peripheral circuit is repaired. The adjustment procedure is described in Section 9.18.		

＊1 : Adjust by remote control.
＊2 : FACTORY ADJ. MODE ON/OFF
Press the FACTORY ADJ. MODE ON/OFF switch (S863) with a thin stick or a similar object through the center hole of the front panel. Press the switch once again, and the normal mode will be re-entered. (Refer to Fig. 9-8)

9.4 WHEN VIDEO/AUDIO ASSEMBLY IS REPLACED

9.4.1 Video section

- Adjust white balance adjustment as described in section 9.3.1.

9.4.2 Microcomputer section

- Peform PIONEER standard setting and blue tailing adjustment as described in section 9.3.2.

9.5 WHEN DEFLECTION ASSEMBLY IS REPAIRED

Note : VR552 thru VR555 are protected by the shield covers (ANH1213) so that they can not be adjusted. Do not try to turn these volumes by removing their shield cover. (Otherwise, the sensitivity of the protection circuit against the X-ray and the anode voltage will be affected.)

9.5.1 Power supply section

Step No.	Adjustment item	Input signal	Adjustment point	Adjustment procedure
1	135V power supply adjustment	Monoscope signal	VR651 (D)	Adjust TP652 voltage to 135V ± 1V.

9.5.2 Deflection section

- Adjustment test points (TP) are located in the DEFLECTION assembly.

Step No.	Adjustment item	Input signal	Adjustment point	Adjustment procedure
1	Focus adjustment	Cross hatch signal	Focus VR (VR)	Optimize the focus of each CRT assembly. (Focus is easier to judge if red and blue are displaced by turning the convergence controls on the remote control as shown in Fig. 9-8. Readjust these controls to their original positions after completing the focus adjustment.)
2	Vertical size adjustment	Monoscope signal or ordinary broadcasting	VR601 (V)	Adjust to 92%±2% when using the monoscope signal, and adjust so that the screen picture does not lack any part of the entire picture field when using the ordinary broadcasting.
3	Horizontal size adjustment		VR551 (D)	
4	White balance adjustment	Ordinary broadcasting	Screen (VR1) (R) (G) (B)	Adjust the white if proper adjustment cannot be achieved as follows. Set the COLOR by the remote control to minimum, adjust the screen VRs to obtained best picture.

9.6 WHEN DEFLECTION ASSEMBLY IS REPLACED

Note : As VR552 thru VR555 in the DEFLECTION assembly supplied as a spare part are not protected by the shield cover (ANH1213), do the followings :

1. When ordering the DEFLECTION assembly, also order the shield cover.
2. Cover VR552 thru VR555 of the DEFLECTION assembly with the shield cover and solder the top position as shown below.(Never turn VR552 thru VR555.)

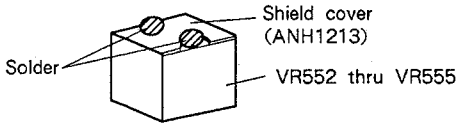


Fig. 9-2 Shield cover

9.6.1 Power supply section

- No adjustment required.

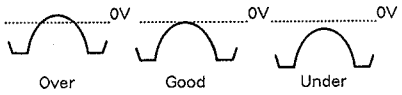
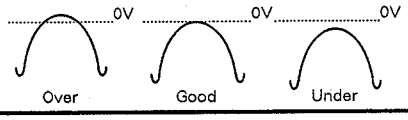
9.6.2 Deflection section

- Adjust focus, vertical size, horizontal size and white balance as described in section 9.5.2.

9.7 WHEN CONVERGENCE ASSEMBLY IS REPAIRED OR REPLACED

- Adjust convergence as described in section "9.7.2 CONVERGENCEE ADJUSTMENT".
- Press the FACTORY ADJ. MODE ON/OFF switch (S863) twice before adjustment. Pressing the switch twice will enter the FACTORY ADJ. MODE, and then the normal mode before adjustment.

9.7.1 PARABOLA WAVEFORM TOP LEVEL ADJUSTMENT

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	TOP LEVEL OF H PARABOLA WAVEFORM	VR701	At TP702, set the top level of output waveform to 0V ± 20mV. 
2	TOP LEVEL OF V PARABOLA WAVEFORM	VR702	At TP701, set the top level of output waveform to 0V ± 20mV. 

9.7.2 CONVERGENCE ADJUSTMENT

- Picture movement and adjustment points are summarized in Fig. 9-3 and 9-4.
- Adjustment points are located in the CONVERGENCE assembly except POSITION control. Also adjust the POSITION by remote control.
- Input signal is the cross-hatch signal.
- Convergence adjustment outline is referred to the Service manual SD-P401/KUX1C (ARP1455), and SD-P40/KU (ARP-977-0), except for H-S-PIN and H-S-LIN adjustments.
- After performed all adjustment, release the short-circuit to obtained white screen and perform the fine-adjustment.
- Correct the vertical line by horizontal correcting signal and correct the horizontal line by vertical correcting signal.

(1) GREEN LINE ADJUSTMENT

- Since the green lines are used as a reference when adjusting red and blue, make sure it is adjusted accurately.
- Short-circuit TP-47R, TP-47B and +12V TP in the VIDEO/AUDIO assembly, then green lines appear in the screen. Release the short-circuit after green line adjustment.

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	GH – PIN	VR703	Adjust the green line to a straight line (refer to Fig. 9-3 and 9-4).
2	GH – KEY	VR704	
3	GV – BOW	VR705	
4	GV – KEY	VR706	
5	GV – S – KEY	VR707	
6	GV – PIN	VR708	
7	Repeat steps 1 thru 6 until the best possible picture is obtained.		

Note : * 1
POSITION adjustment is possible when PRESET MENU switches (S875, S870) are pushed, and CONVERGENCE mode of MENU is set.
Since CROSS TEST signal is displayed forcibly in the case of CONVERGENCE mode, adjust with this signal. (Refer to page 14 of Operating Instructions with this Service Manual.) After finishing the POSITION adjustment, set the MENU switch to off.

(2) RED LINE ADJUSTMENT

- Short-circut TP-47B and +12V TP, then green lines and red lines appear in the screen. Release the short-circuit after red line adjustment.
- Adjust each VR so that the red lines converge with the green lines to obtain yellow lines.
- After adjustmet, perform fine-adjustment by observing the overall screen.

● Red horizontal distortion compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	RH-SKEW	VR709	Adjust the red vertical lines in the center of the screen to straight lines without distortion and lean. (Refer to Fig. 9-3.)
2	RH-BOW	VR710	
3	Repeat steps 1 and 2.		
4	RH-KEY	VR711	Adjust the red vertical lines in the right and left section of the screen to straight lines without lean. (Refer to Fig. 9-3.)
5	RH-S-KEY	VR712	
6	Repeat steps 4 and 5.		
7	RH-PIN	VR713	Adjust the red vertical lines in the right and left sections of the screen to straight lines without distortion. (Refer to Fig. 9-3.)
8	RH-S-PIN	VR714	
9	Repeat steps 7 and 8 or steps 1 thru 8.		

● Red horizontal interval compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	RH-POSITION	*1 Keys 4, 5 and 6 of remote control	Adjust so that the red vertical lines converge with the green vertical lines in the center of the screen to obtain yellow lines. (This serves as the reference setting, but if the lines diverge during the adjustment, proceed with the adjustment after considering this divergence.)
2	RH-LIN	VR715	Adjust so that the red vertical lines converge with the green vertical lines in the right and left sections of the screen to obtain yellow lines. (Refer to Fig. 9-3)
3	RH-S-LIN	VR716	
4	RH-SIZE	VR717	
5	Repeat steps 1 thru 4.		

● Red vertical distortion compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	RV-SKEW	VR718	Adjust the red horizontal lines in the center of the screen to straight lines without distortion and lean. (Refer to Fig. 9-4.)
2	RV-BOW	VR719	
3	Repeat steps 1 and 2.		
4	RV-KEY	VR720	Adjust the red horizontal lines in the lower and upper sections of the screen to straight lines without lean. (Refer to Fig. 9-4.)
5	RV-S-KEY	VR721	
6	RV-PIN	VR722	
7	Repeat steps 4 thru 6 or steps 1 thru 6.		

● Red vertical interval compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	RV-LIN	VR723	Adjust so that the red horizontal lines converge the green horizontal lines in the center of the screen to obtain yellow lines. (This serves as the reference setting, but if the lines diverge during the adjustment, proceed with the adjustment after considering this divergence.) (Refer to Fig. 9-4.)
2	RV-POSITION	*1 Keys 2, 5 and 8 of remote control	
3	RV-SIZE	VR724	Adjust so that the red horizontal lines converge the green horizontal lines in the lower and upper sections of the screen to obtain yellow lines. (Refer to Fig. 9-4.)
4	Repeat steps 1 thru 3.		

*1 : See page 84.

(3) BLUE LINE ADJUSTMENT

- Short-circuit TP-47R and +12V TP, then green lines and blue lines appear in the screen. Release the short-circuit after blue line adjustment.
- Adjust each VR so that the red lines converge with the green lines to obtain cyan lines.
- After adjustment, perform fine-adjustment by observing the overall screen.

● Blue horizontal distortion compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	BH-SKEW	VR725	Observe the blue vertical lines in the screen, and adjust in the same way as the red horizontal distortion compensation adjustment.
2	BH-BOW	VR726	
3	BH-KEY	VR727	
4	BH-S-KEY	VR728	
5	BH-PIN	VR729	
6	BH-S-PIN	VR730	

● Blue horizontal interval compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	B-H-POSITION	*1 Keys 4, 5 and 6 of remote control	Adjust so that the blue lines converge with the green lines to obtain cyan lines in the same way as the red horizontal interval compensation adjustment. However, BH-S-LIN movements are reversed on the left and right sides of RH-S-LINE. The main points of BH-LIN and BH-S-LIN are reversed on the left and right sides of RH-LIN and RH-S-LIN.
2	BH-LIN	VR731	
3	BH-S-LIN	VR732	
4	BH-SIZE	VR733	

● Blue vertical distortion compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	BV-SKEW	VR734	Observe the blue horizontal lines in the screen, and adjust in the same way as the red vertical distortion compensation adjustment.
2	BV-BOW	VR735	
3	BV-KEY	VR736	
4	BV-S-KEY	VR737	
5	BV-PIN	VR738	

● Blue vertical interval compensation adjustment

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	BV-LIN	VR739	Adjust so that the blue lines converge with the green lines to obtain cyan lines in the same way as the red vertical interval compensation adjustment.
2	BV-POSITION	*1 Keys 2, 5 and 8 of remote control	
3	BV-SIZE	VR740	

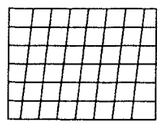
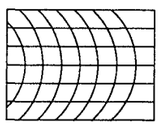
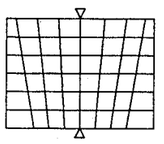
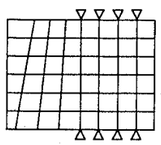
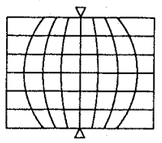
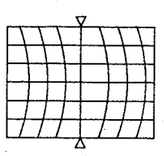
*1 : See page 84.

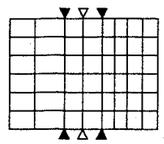
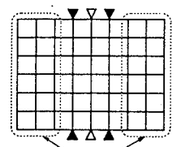
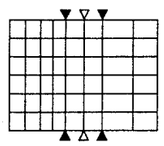
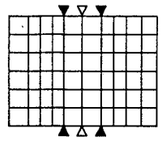
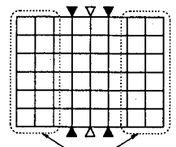
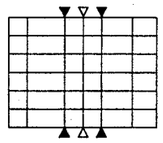
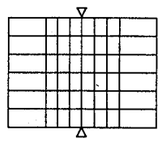
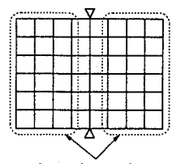
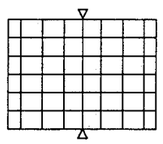
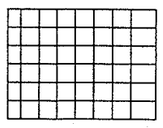
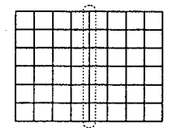
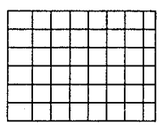
Compensation	Signal and mark ＊1	Compensating signal	Distorted screen	Corrected screen	Distorted screen	Adjustment point	
Horizontal distortion compensation	H－SKEW	V sawtooth wave		Attention point		Observe the vertical lines in the center of the screen (where there is no H－KEY, H－S－KEY, H－PIN nor H－S－PIN movement), then adjust the vertical lines to eliminate lean.	To obtain the best possible lines, adjust the vertical lines in the center of the screen following the adjustment pro－cedure of H－SKEW and H－BOW.
	H－BOW	V parabolic wave		Attention point		Observe the vertical lines in the center of the screen, then adjust the bowed lines to straight lines.	
	H－KEY	V sawtooth wave × H sawtooth wave		Attention point		Observe the vertical lines in the right section of the screen (where there is no H－S－KEY nor H－S－PIN movement), then adjust the vertical lines to eliminate lean.	To eliminate lean, adjust the vertical lines in the right and left sections of the screen following the adjustment pro－cedure of H－KEY and H－S－KEY.
	H－S－KEY	V sawtooth wave × 1/2 H sawtooth wave		Attention point		Observe the vertical lines in the left section of the screen, then adjust the vertical lines to eliminate lean.	
	H－PIN	V parabolic wave × H sawtooth wave		Attention point		Observe the vertical lines in the right and left sections of the screen, then adjust the bowed lines to symmetrize the right and left by H－S－PIN. And adjust the bowed vertical lines in the right and left sections of the screen to straight lines by H－PIN.	To eliminate distortion, straighten the vertical lines in the right and left sections of the screen following the adjustment procedure of H－PIN and H－S－PIN.
	H－S－PIN	V parabolic wave × H parabolic wave		Attention point			

Compensation	Signal and mark ＊1	Compensating signal	Distorted screen
Horizontal interval compensation	H－LIN	H parabolic wave	
	H－S－LIN		
	H－SIZE	H sawtooth wave	
	H－POSITION	DC voltage	

Note : KEY is short for KEYST
and LIN for LINEARITY
▽ : denotes points whict
▼ : denotes points whict
＊1 : Sketch is printed on the

Fig. 9－3 Horizontal compensation

Distorted screen	Adjustment point	
	Observe the vertical lines in the center of the screen (where there is no H-KEY, H-S-KEY, H-PIN nor H-S-PIN movement), then adjust the vertical lines to eliminate lean.	To obtain the best possible lines, adjust the vertical lines in the center of the screen following the adjustment pro-cedure of H-SKEW and H-BOW.
	Observe the vertical lines in the center of the screen, then adjust the bowed lines to straight lines.	
	Observe the vertical lines in the right section of the screen (where there is no H-S-KEY nor H-S-PIN movement), then adjust the vertical lines to eliminate lean.	To eliminate lean, adjust the vertical lines in the right and left sections of the screen following the adjustment pro-cedure of H-KEY and H-S-KEY.
	Observe the vertical lines in the left section of the screen, then adjust the vertical lines to eliminate lean.	
	Observe the vertical lines in the right and left sections of the screen, then adjust the bowed lines to symmetrize the right and left by H-S-PIN. And adjust the bowed vertical lines in the right and left sections of the screen to straight lines by H-PIN.	To eliminate distortion, straighten the vertical lines in the right and left sections of the screen following the adjustment procedure of H-PIN and H-S-PIN.
		

Compensation	Signal and mark ＊1	Compensating signal	Distorted screen	Corrected screen	Distorted screen	Adjustment point	
Horizontal interval compensation	H-LIN	H parabolic wave		 Attention point		Adjust following the adjust-ment procedure of H-LIN and H-S-LIN (remember the degree of H-SIZE movement) so that the interval between vertical lines on the right section is the same as on the left section, with a central point which does not move. For example, when the vertical lines in the right section of the screen are moved to right direction, move the vertical lines in the left section of the screen as same degree as the gap in the right section to the left direction.	The vertical lines in the center of the screen converge into the green lines by H-POSITION. And also, the vertical lines in the right and left sections of the screen converge into the green lines by H-LIN, H-S-LIN and H--SIZE.
	H-S-LIN	H		 Attention point			
	H-SIZE	H sawtooth wave		 Attention point		Converge the vertical lines in the right and left sections of the screen to green lines.	
	H-POSITION	DC voltage		 Center of the screen		The vertical lines of the screen move parallel on the right and left by the convergence control of the remote control. When the vertical line moves at will, consider the degree of move-ment.	

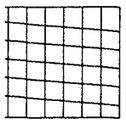
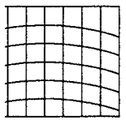
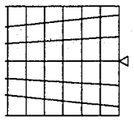
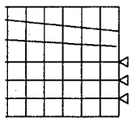
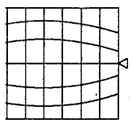
Note : KEY is short for KEYSTONE,
and LIN for LINEARITY
▽ : denotes points which do not move
▼ : denotes points which hardly move
＊1 : Sketch is printed on the p.c. board.

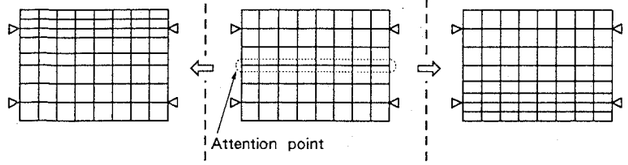
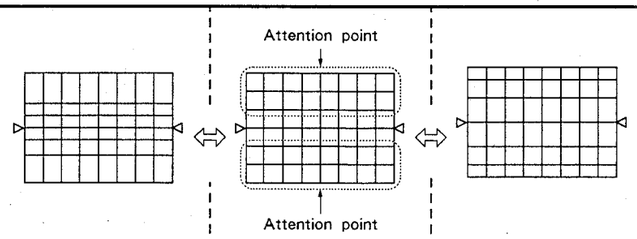
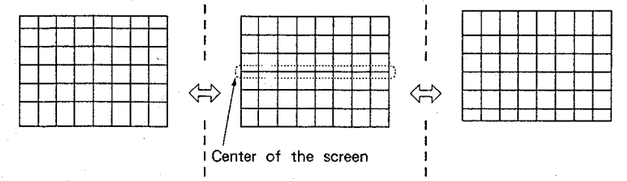
Fig. 9-3 Horizontal compensation

Compensation	Signal and mark ＊1	Compensating signal	Distorted screen	Corrected screen	Distorted screen	Adjustment point	
Vertical distortion compensation	V – SKEW	H sawtooth wave		Attention point		Observe the horizontal lines in the center of the screen (where there is no V – KEY, V – S – KEY, V – PIN nor V – S – PIN movement), then adjust the horizontal lines to eliminate lean.	To obtain the best possible lines, adjust the horizontal lines in the center of the screen following the adjustment procedure of V – SKEW and V – BOW.
	V – BOW	H parabolic wave		Attention point		Observe the horizontal lines in the center of the screen, then adjust the bowed lines to straight lines.	
	V – KEY	V sawtooth wave × H sawtooth wave		Attention point		Observe the horizontal lines in the lower section of the screen (where there is no V – S – KEY movement), then adjust the horizontal lines to eliminate lean.	To eliminate lean, adjust the horizontal lines in the upper and lower sections of the screen following the adjustment procedure of V – KEY and V – S – KEY.
	V – S – KEY	1/2 V sawtooth wave × H sawtooth wave		Attention point		Observe the horizontal lines in the upper section of the screen, then adjust the hori- zontal lines to eliminate lean.	
	V – PIN	V sawtooth wave × H parabolic wave		Attention point / Attention point		Observe the horizontal lines in the upper and lower sections of the screen, then adjust the bowed lines to straight lines.	To eliminate distortion, straighten the horizontal lines in the upper and lower sections of the screen following the adjustment procedure of V – PIN and V – S – PIN.

Compensation	Signal and mark ＊1	Compensating signal	Distorted screen	C
Vertical interval compensation	＊2 V – LIN	V parabolic wave		Attent
	V – S – LIN		No adjustmer	
	V – SIZE	V sawtooth wave		
	V – POSITION	DC voltage		Center

Fig. 9-4 Vertical compensation

torted screen	Adjustment point	
	Observe the horizontal lines in the center of the screen (where there is no V－KEY, V－S－KEY, V－PIN nor V－S－PIN movement), then adjust the horizontal lines to eliminate lean.	To obtain the best possible lines, adjust the horizontal lines in the center of the screen following the adjustment procedure of V－SKEW and V－BOW.
	Observe the horizontal lines in the center of the screen, then adjust the bowed lines to straight lines.	
	Observe the horizontal lines in the lower section of the screen (where there is no V－S－KEY movement), then adjust the horizontal lines to eliminate lean.	To eliminate lean, adjust the horizontal lines in the upper and lower sections of the screen following the adjustment procedure of V－KEY and V－S－KEY.
	Observe the horizontal lines in the upper section of the screen, then adjust the hori－zontal lines to eliminate lean.	
	Observe the horizontal lines in the upper and lower sections of the screen, then adjust the bowed lines to straight lines.	To eliminate distortion, straighten the horizontal lines in the upper and lower sections of the screen following the adjustment procedure of V－PIN and V－S－PIN.

Compensation	Signal and mark ＊1	Compensating signal	Distorted screen	Corrected screen	Distorted screen	Adjustment point	
Vertical interval compensation	＊2 V－LIN	V parabolic wave				Converge the horizontal lines in the center of the screen into green lines. At this time, be sure to the same horizontal line interval as upper section as lower section about a central point. However, if the same interval is not to obtained, adjust POSITION and adjust V－LIN again.	The horizontal lines in the center of the screen converge into the green line by V－LIN and V－POSITION. And also the horizontal lines in the upper and lower sections of the screen converge into the green line by V－SIZE.
	V－S－LIN	No adjustment				——	
	V－SIZE	V sawtooth wave				Converge the horizontal lines in the upper and lower sections of the screen into green lines.	
	V－POSITION	DC voltage				The horizontal lines of the screen move parallel on the upper and lower by the convergence control of the remote control. When the horizontal line moves at will, consider the degree of movement.	

Note : KEY is short for KEYSTONE, and LIN for LINEARITY.
▽ : denotes points which do not move.
＊1 : Sketch is printed on the P.C. board.
＊2 : The movement of V－LIN is the same as the SD－P40/KU.

Fig. 9－4 Vertical compensation

9.8 WHEN FRONT CONTROL ASSEMBLY IS REPAIRED

Step No.	Adjustment item	Input signal	Adjustment point	Adjustment procedure
1	DPO sensitivity adjustment	Adjust DPO sensitivity adjustment as described in section 9.19.		

9.9 WHEN FRONT CONTROL ASSEMBLY IS REPLACED

- No adjustment required.

9.10 WHEN R, G, OR B CRT ASSEMBLY IS REPAIRED OR REPLACED

- White balance should require very little adjustment, but if necessary, adjust as described in Section "9. 5 When DEFLECTION assembly is repaired".

9.11 WHEN CRT ASSEMBLY R, G, OR B IS REPLACED

- The CRT assembly R, G, B replacement procedure is described in Section "10. Replacing the CRT assembly".
- When one or two tubes are replaced, match the new tubes with the remaining tube. If all three tubes are replaced, first adjust G, and then match the other two tubes with the G tube.

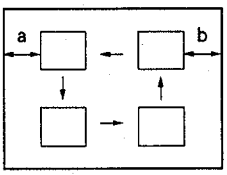
Step No.	Adjustment item	Input signal	Adjustment point	Adjustment procedure
1	Deflection yoke angle and centering adjustment	Cross signal (or apply any signal, and set PRESET MENU switches S875 and S870 to generate a cross test signal)	Centering magnet of deflection yoke of replaced CRT assembly (Refer to Fig. 9-9)	Adjust the deflection yoke angle until the color cross of the replaced CRT assembly is parallel with the color cross of a CRT assembly which has not been replaced.
				Turn the convergence control to the center position when the red or blue CRT assembly is replaced. Press the FACTORY ADJ MODE ON/OFF switch (S863) twice so that the test cross signal is reset to the default status. Pressing the switch twice will enter the FACTORY ADJ MODE, and then the normal mode.
				Adjust the centering magnet of the deflection yoke in the replaced CRT assembly until cross becomes converge.
2	Focus adjustment	Cross hatch	Replaced color focus VR (VR1) and lens assembly connected to replaced CRT assembly (Refer to Fig. 9-8 and Fig. 9-10)	Adjust the focus of the replaced CRT assembly to optimum condition. (The focus is easier to see if red and blue are displaced by turning the convergence control of remote control at this time. But remember to turn the knob back after completing the adjustment.)
3	Convergence adjustment		Match the color convergence of the replaced CRT assembly with the color an assembly which has not been replaced. See Section 9.7.2 CONVERGENCE ADJUSTMENT for details on the matching procedure. (When CRT assembly G is replaced, match the color convergence of the R, G and B.)	
4	White balance	Color bar signal without color signal	Screen VR (VR1) VR102 (R) } Drive VR VR105 (B) } (V)	Set standard values "0" by remote control unit.
				Adjust the replaced color screen VR until grey can be seen in the color of dark area.
				Adjust the replaced color drive VR until the color of bright area becomes white. (When CRT assembly G is replaced, slightly adjust the drive VR [R] and [B].)
				Adjust the PIONEER Standard brightness only when the above adjustments have not been successfully effectuated due to the abnormal brightness.
5	PIONEER standard settings	Adjust as described in steps 1 thru 7 in Section 9.3.2.		

9.12 WHEN LENS ASSEMBLY IS REPLACED

- Remove the lenticular sheet, and attach tracing paper with a plastic tape, etc. instead. (Refer to Fig. 9-10.) Adjust the focus of the lens assembly newly mounted, by observing the picture shown on the tracing paper.

9.13 WHEN PINP ASSEMBLY IS REPAIRED (Only for the models having the Picture-in-Picture function)

- Set the input selector to VDP.
- Input color bar signal to the INPUT VDP VIDEO termenal.

Step No.	Adjustment item	Input signal	Adjustment point	Adjustment procedure
1	Output level of video signal	Color bar	VR512	Adjust so that the video signal level of TP-12 in the VIDEO / AUDIO assembly to 2Vp-p.
• Activate the PINP function so that the sub-picture appears. • Using the sub-picture size switch on the remote control unit, set the sub-picture size to 1/3-size (the bigger). • Set the input selector to TV for both the main-picture and the sub-picture. (The same picture appears on the main and sub-picture.)				
2	Bright of sub-picture	Ordinary broadcasting	VR511 (clamp)	Adjust so that the bright of sub-picture is the same as the main-picture.
3	Color of sub-picture		VR502	Adjust so that the color of sub-picture is the same as the main-picture.
4	Tint of sub-picture		VR501	Adjust so that the tint of sub-picture is the same as the main-picture.
5	Read clock (Sub-picture position)		VR522	Move the sub-picture with the POSITION switch on the remote control unit and adjust so that the length "a" becomes equal to the length "b", as shown in Fig. 9-5.  Fig.9 – 5 Position of sub – picture
6	Write clock (Center in the sub-picture)		VR521	Adjust so that the picture displayed at the center of the main-picture is also displayed at the center of the sub-picture.

9.14 WHEN PINP ASSEMBLY IS REPLACED (Only for the models having the Picture-in-Picture function)

- No adjustment required.

9.15 WHEN SURROUND ASSEMBLY IS REPAIRED (SD-P503S-Q and SD-P453S-Q/KUX1C types only)

- Set S451 (BUILT-IN SURROUND PROCESSOR) at the rear to ON.
- Set the surround mode to DOLBY, minimize front volume and surround volume by the remote control unit.
- Set VR501 (INPUT BALANCE) at the rear to center.
- Input signal : 1kHz sinewave, 500mV/rms, VDP Audio L ch (or R ch) only.
- Adjustment test points (TP) are located in the SURROUND assembly (Refer to Fig. 9-7).

Step No.	Adjustment item	Adjustment point	Adjustment procedure
1	Dolbly level adjustment	VR502	Adjust the TP DOLBY LEVEL ADJ to 100mV (rms) ±5%.

9.16 WHEN SURROUND ASSEMBLY IS REPLACED (SD-P503S-Q and SD-P453S-Q/ KUX1C types only)

● No adjustment required.

9.17 WHEN OTHER ASSEMBLIES ARE REPAIRED OR REPLACED

● No adjustment required.

9.18 DPO LEVEL SETTING

The DPO function features a DPO light-sensitive section in the front control panel designed to judge the level of external light when the front panel DPO switch (S872) in ON, thereby matching the PROJECTION MONITOR RECEIVER picture quality (contrast, color, bright) with the external light.
Although picture quality is standard under bright conditions, the quality is changed if the environment becomes dark, and is changed to a fixed level if the environment becomes completely dark. This picture quality level is stored in a non-volatile memory (IC205).
Hence, if IC205 (or peripheral circuits) is repaired or replaced, or if VIDEO/AUDIO assembly is replaced, picture quality must be stored in IC205 again.
Refer to page 22 ("DPO ADJUSTMENT") of Operating Instructions with this Sevice Manual.

The picture quality set in step (2) is thus stored in memory. The default values set prior to shipment from the factory are given below for reference.

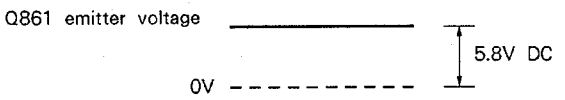
Contrast	− 18
Color	− 3
Bright	+ 4

Note : Values subject to possible modification without notice, due to improvements.

9.19 DPO SENSITIVITY ADJUSTMENT

The sensitivity of the DPO light-sensitive section is adjusted to determine the level of external light at which the DPO feature is activated. This adjustment is made by VR861 in the FRONT CONTROL assembly (refer to Fig. 9-7), and should be carried out according to the customer's preferences. The adjustment procedure used at the factory is given for reference.

(1) Using an incandescent light bulb as the light source, light is beamed directly into the DPO light sensitive section with a light-intensity level of 50 lux at the DPO.
(2) Switch the DPO switch (S872) on. "DPO ON" indicate in the screen.
(3) FRONT CONTROL assembly VR861 is adjusted to obtain a voltage of 5.8V (± 0.1V) at the Q861 emitter.



Note : Values subject to possible modification without notice, due to improvements.

9.20 ANODE CABLE CONNECTION AND DISCONNECTION

SERVICEMAN WARNING

High voltage (31.8kV) will remain at anode of the picture tube for a long period after turning power off even more than one or two weeks.

In this state, it will be really dangerous if any kind of operation which has a risk of electric shock at anode is carried out ; such as replacement of the picture tube (CRT assembly R, G, B) or exchanging and removing an anode cable.

When these kinds of operations are required, be sure to discharge anode voltage following the procedure of "Discharge of anode voltage", page 7.

Disconnect the FBT anode cable as outlined in Fig. 9-6. Confirm the extension of the rubber cover before disconnecting the cable, then it is easy to connect the anode cable after the anode voltage is measured. When connecting the anode cable, proceed in the reverse order as mentioned above. Confirm that the cable will not come off by pulling it after the cable is connected.

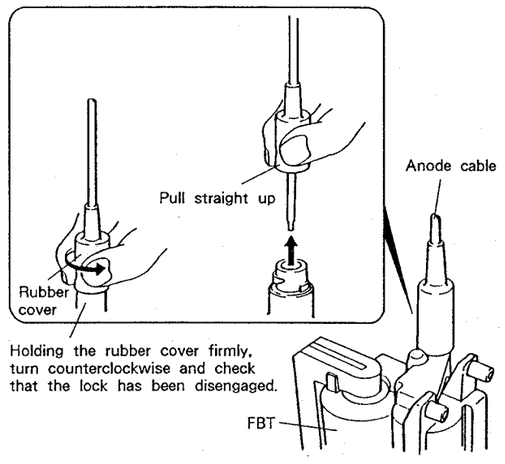
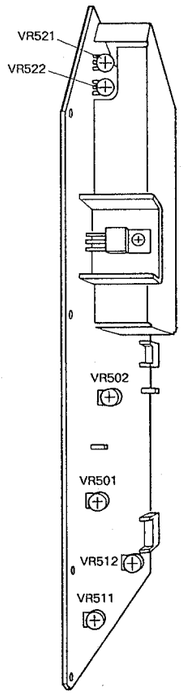


Fig. 9-6 Disconnecting the anode cable

PINP assembly



SURROUND assembly
(SD-P503S-Q and SD-P453S-Q/KUX1C types only)

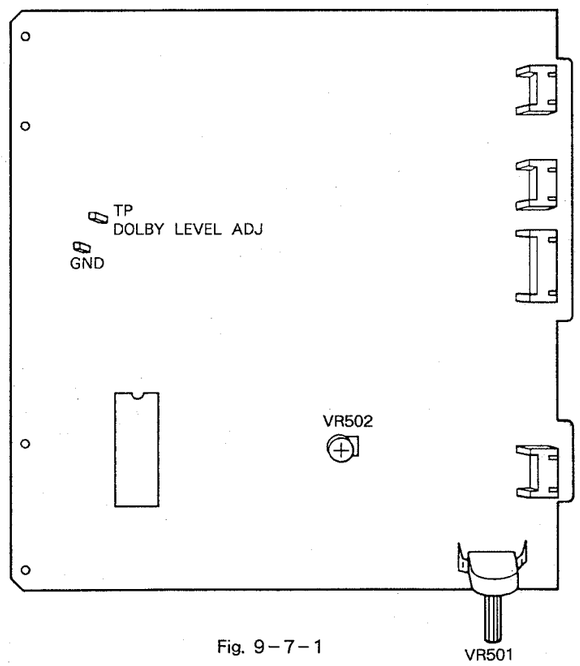


Fig. 9-7-1

TUNER assembly

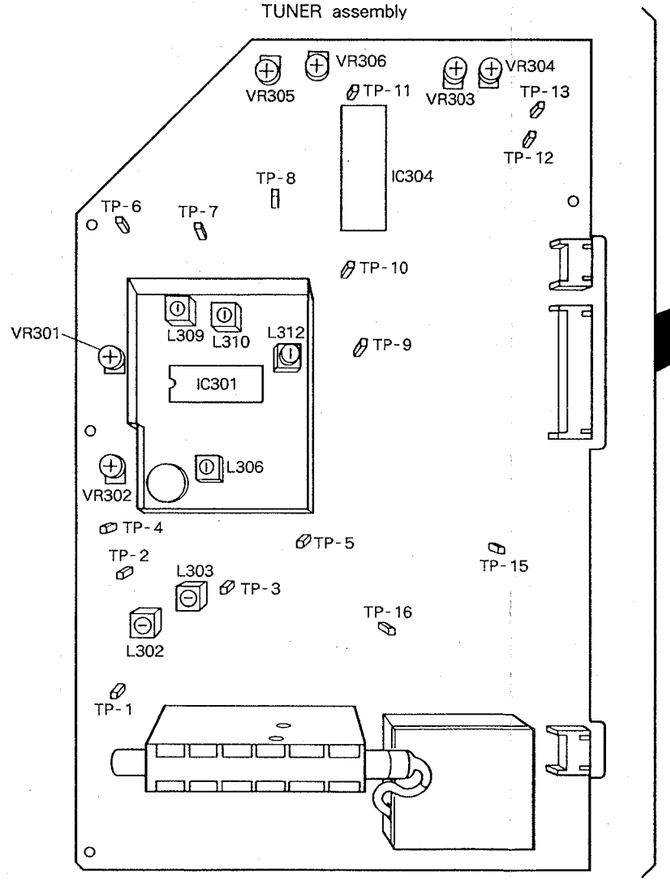
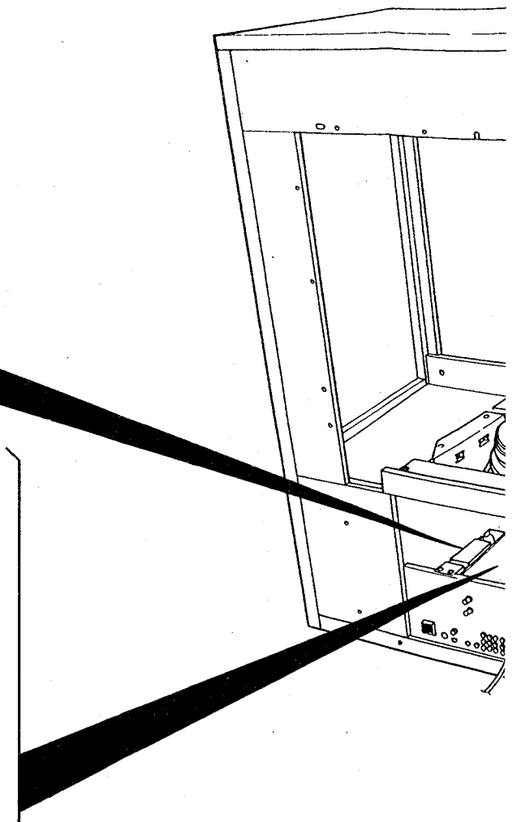
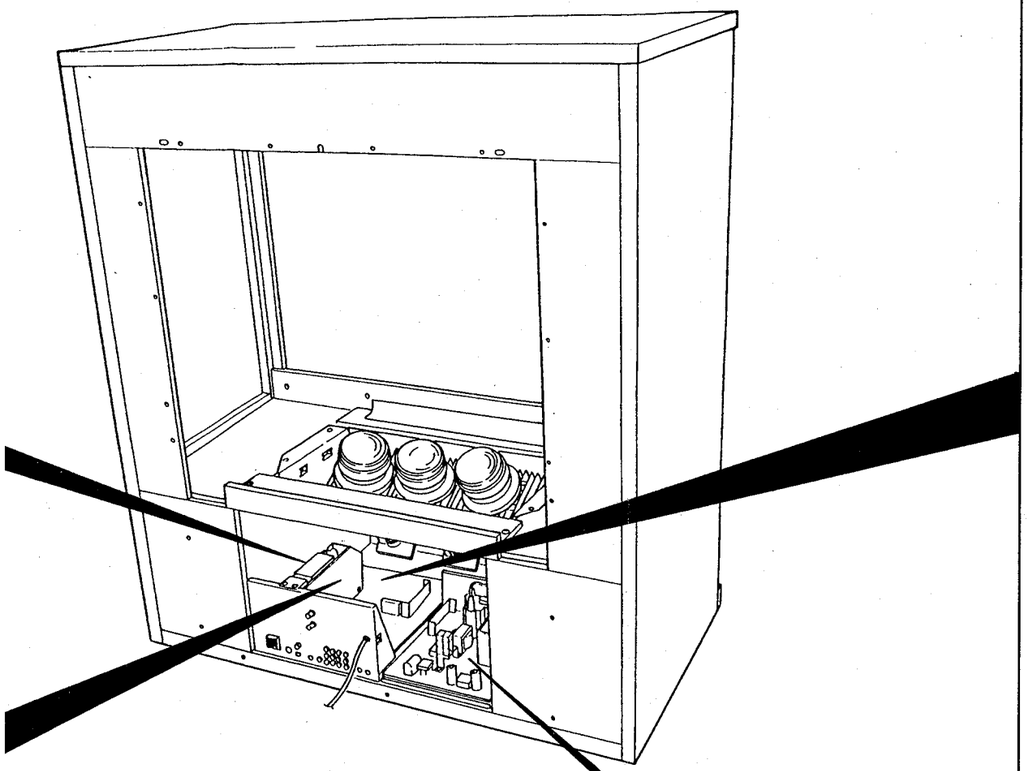


Fig. 9-7-2



Note : T
S

Fig. 9-



Note : This figure is appropriated to the SD-P503P-QD/KUX1C type.

Fig. 9-7 Adjustment point (1)

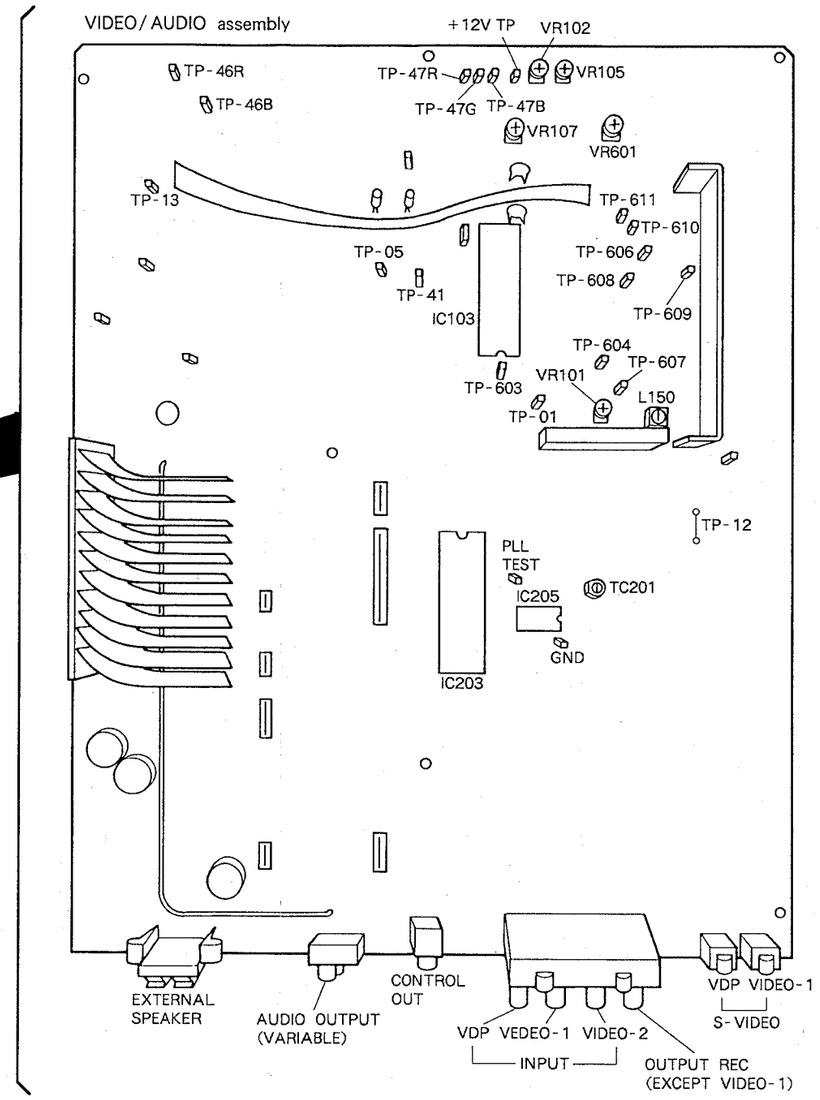
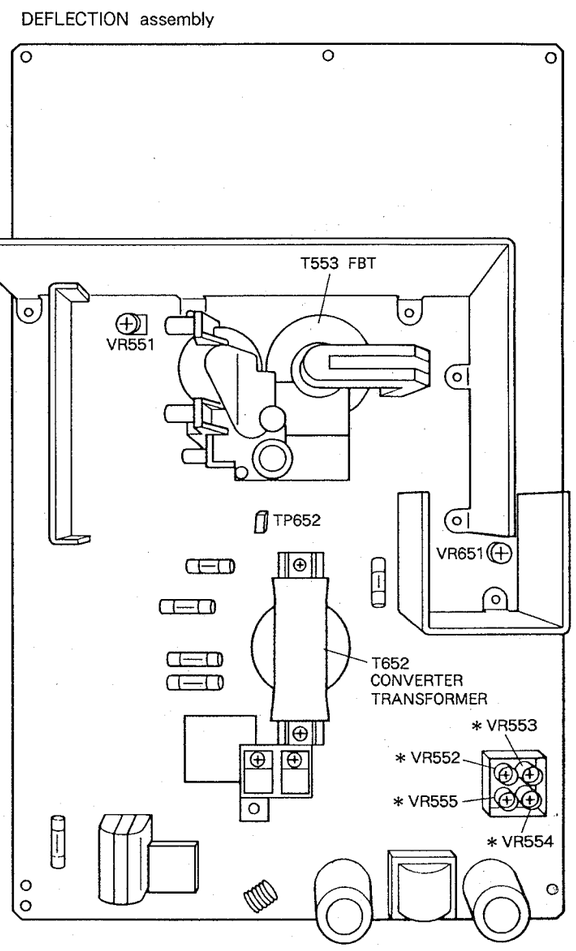
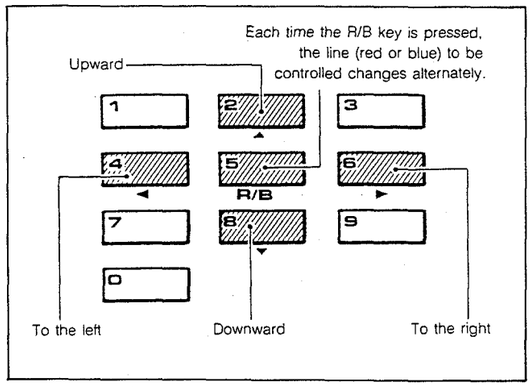


Fig. 9-7-3

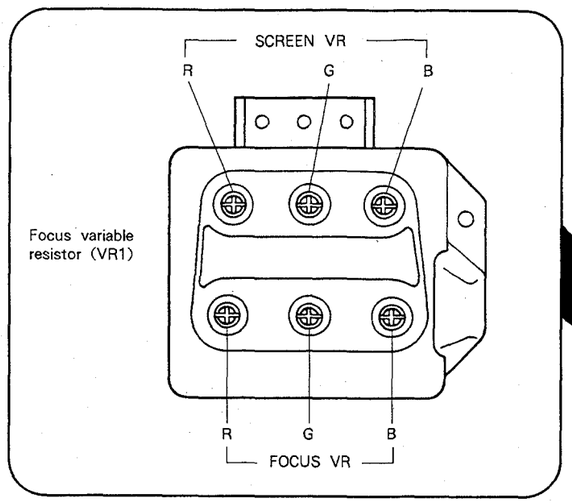


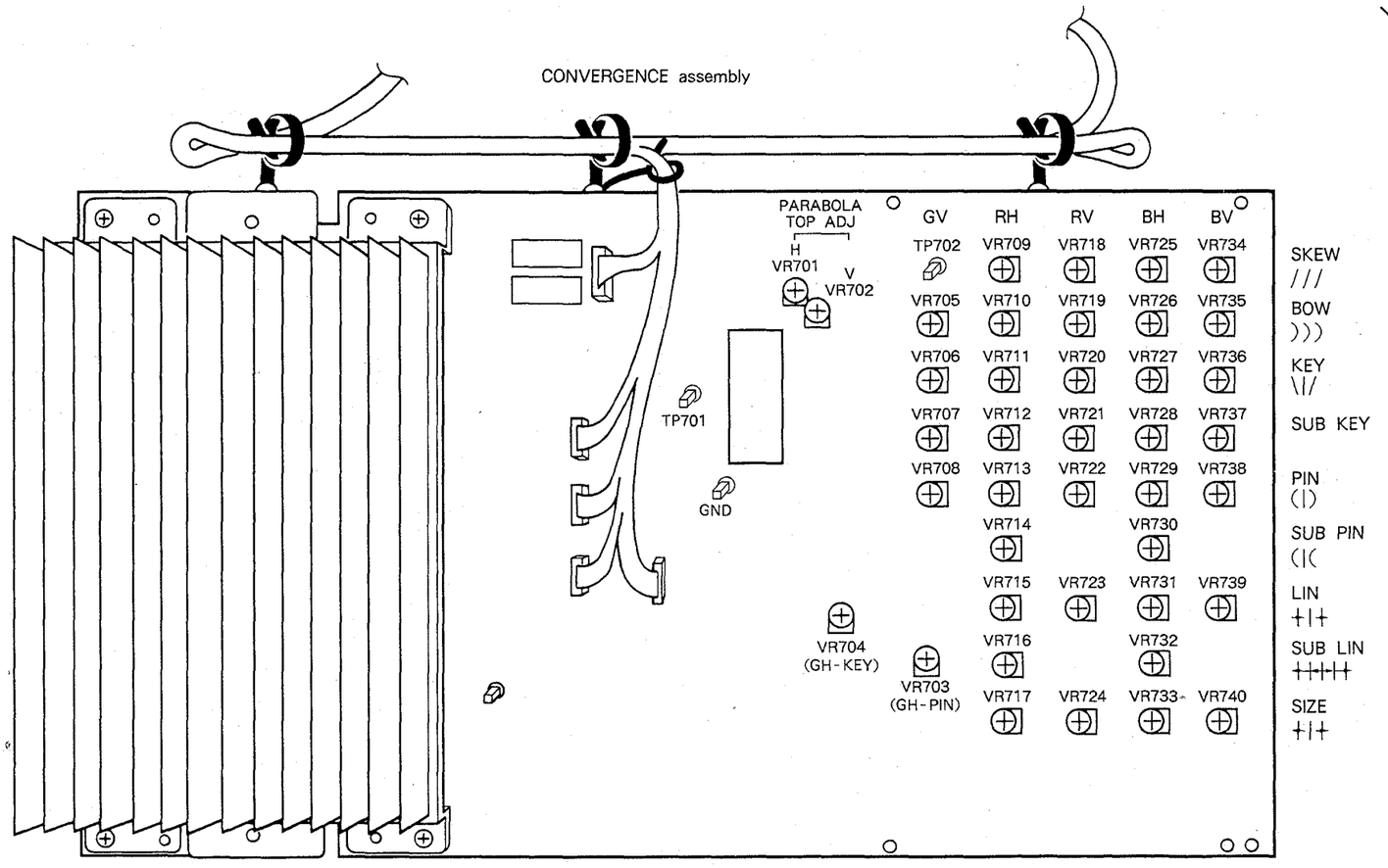
Note : Do not turn VR552 thru VR555 (*)

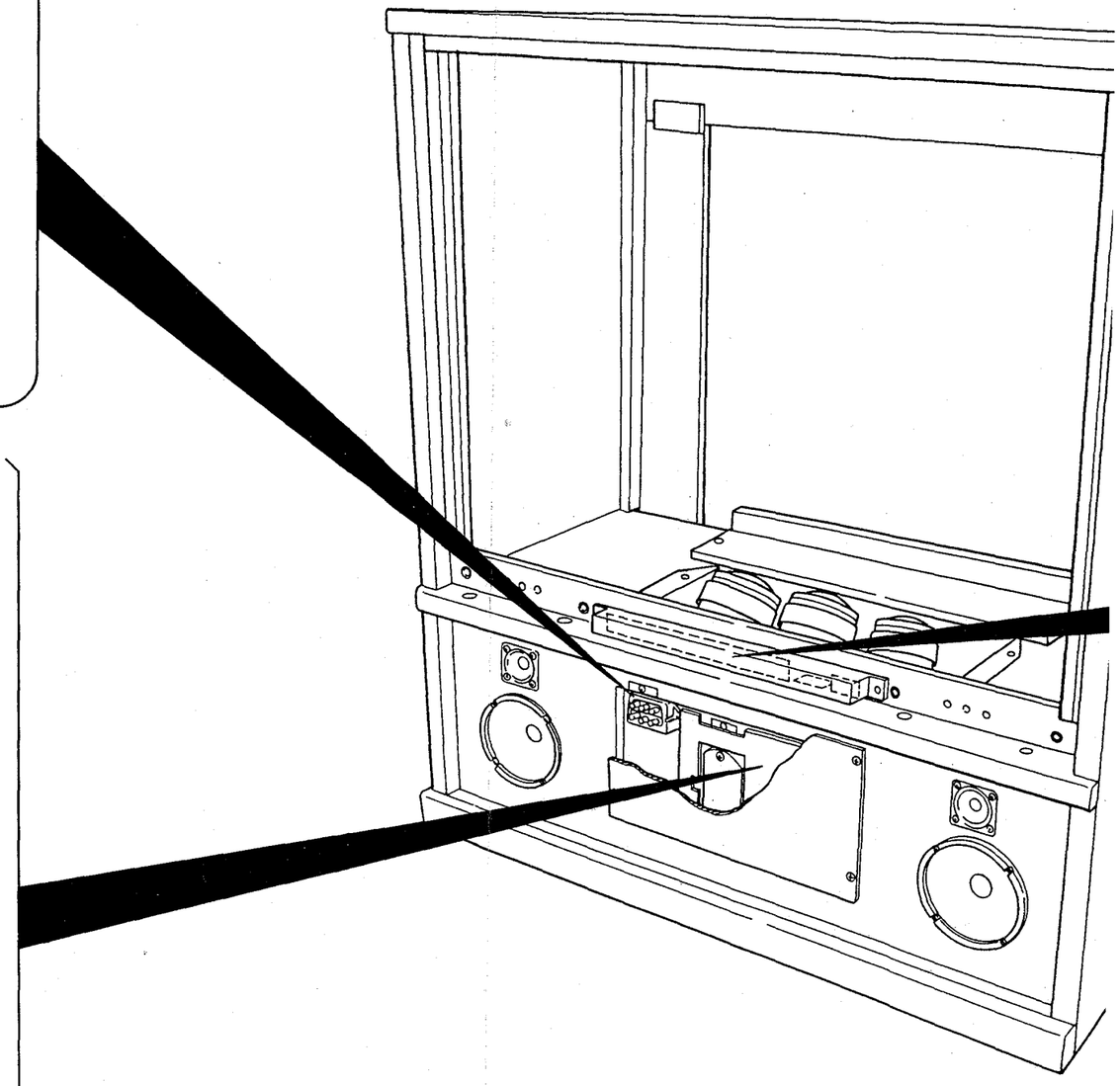
Fig. 9-7-4



REMOTE CONTROLER KEY FUNCTION FOR CONVERGENCE

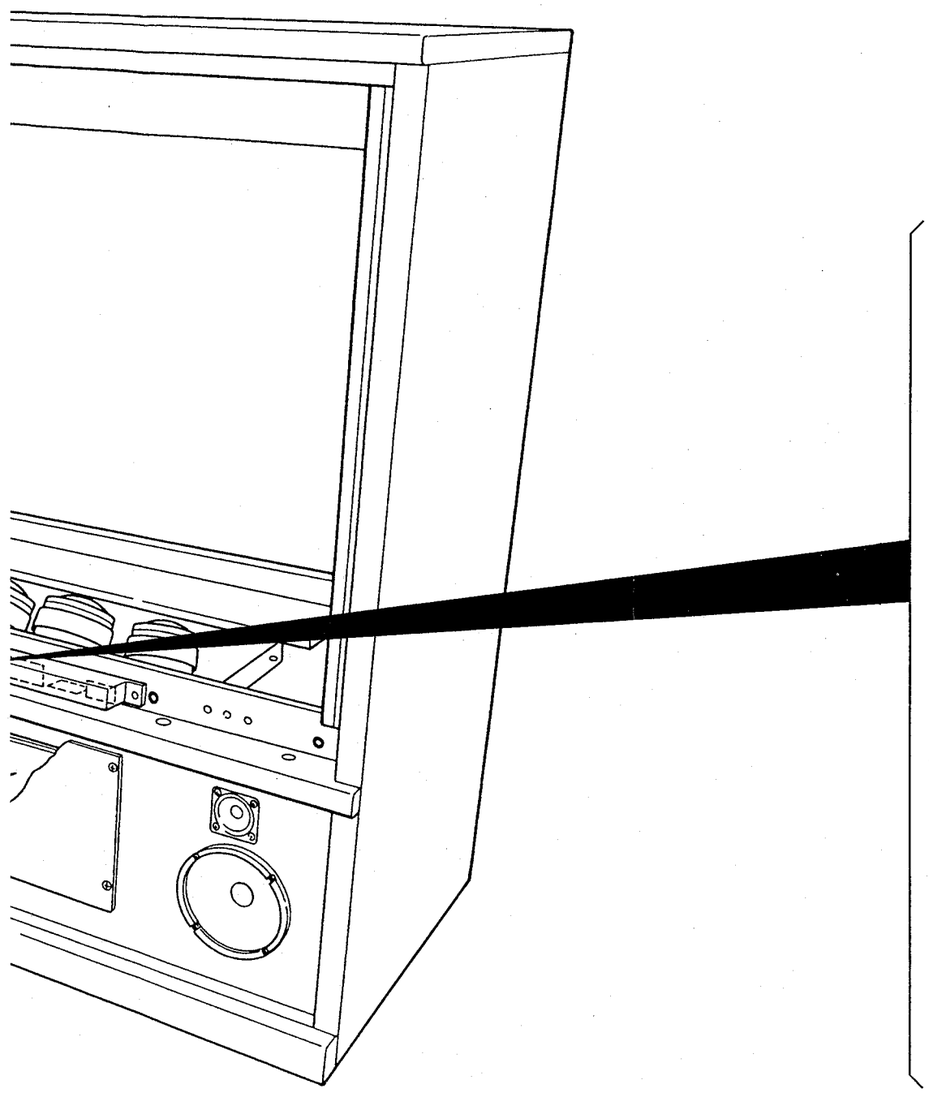






Note : This figure is appropriated to the SD-P503P-QD/KUX1C type.

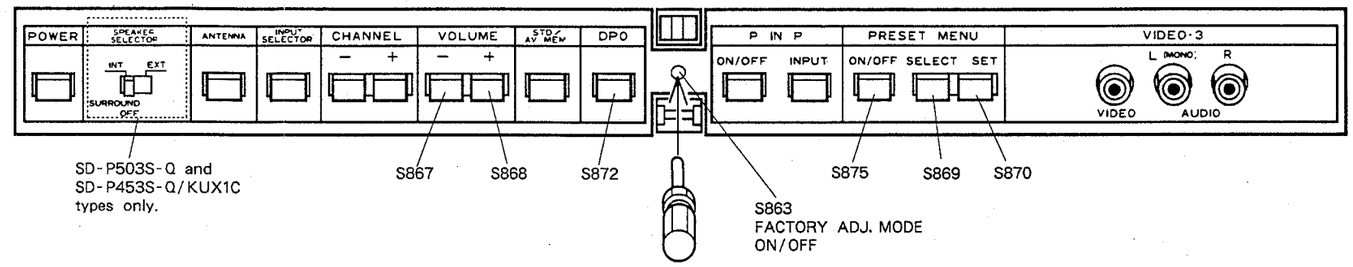
Fig. 9-8 Adjustment point (2)

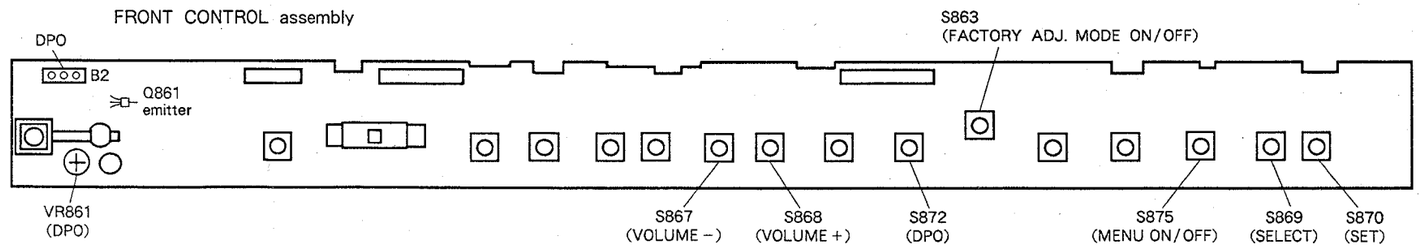


ɔpriated to the
X1C type.

point (2)

● **Front panel**





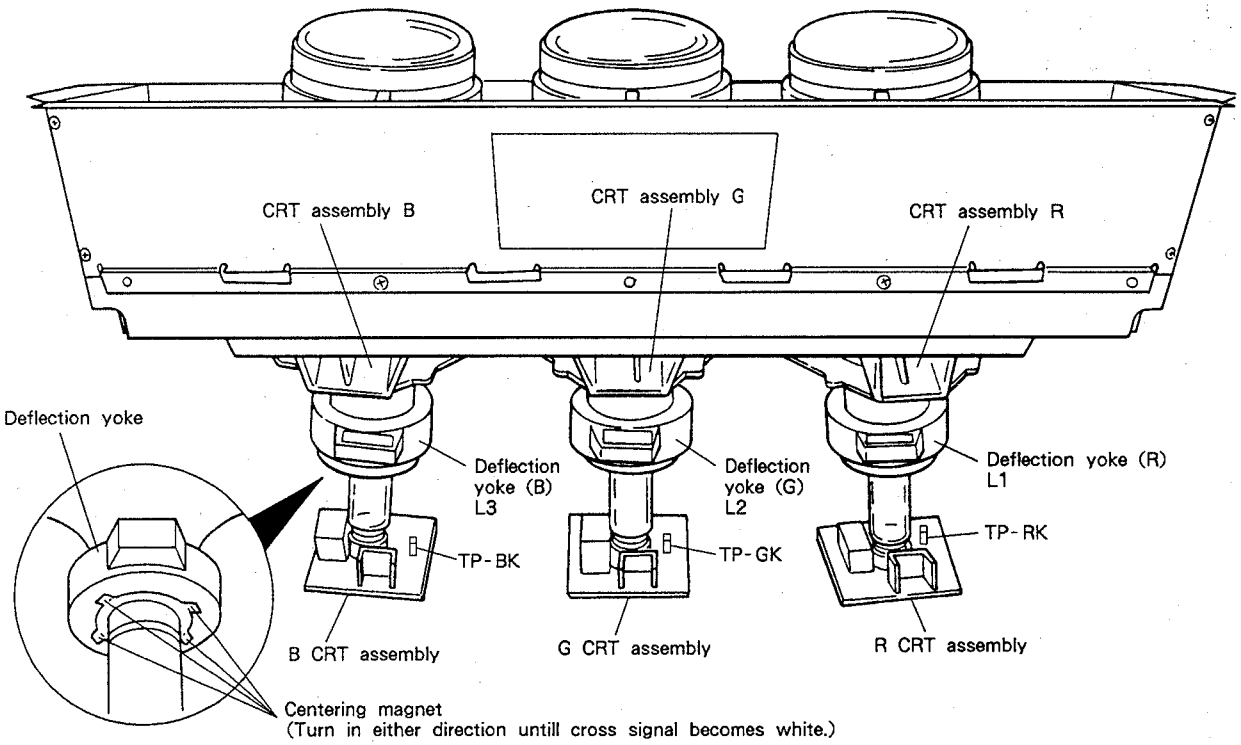


Fig. 9-9 Adjustment point (3)

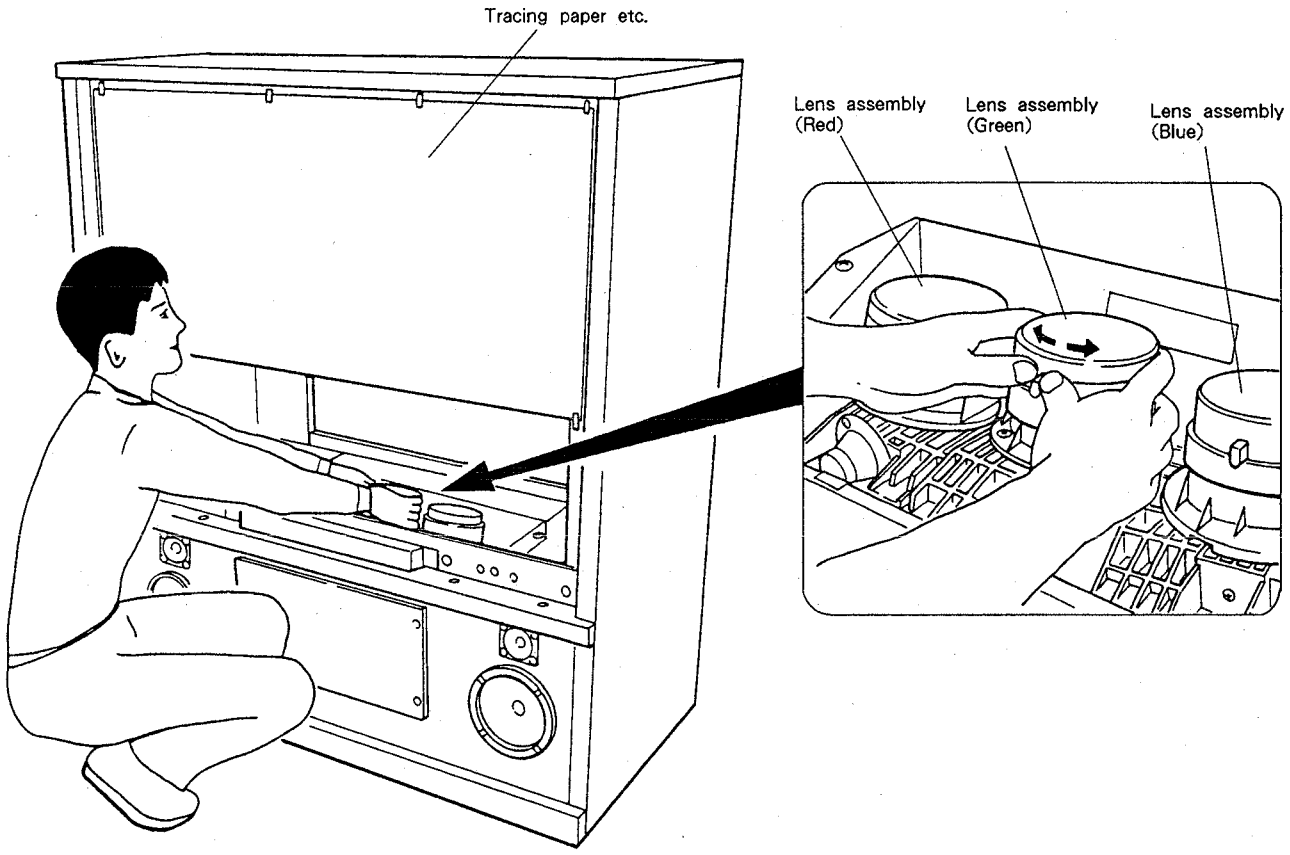


Fig. 9-10 Adjustment point (4)

10. REPLACING THE CRT ASSEMBLY

Serviceman Warning

High voltage (31.8kV) will remain at anode of the picture tube for a long period after turning power off even more than one or two weeks.

In this state, it will be really dangerous if any kind of operation which has a risk of electric shock at anode is carried out ; such as replacement of the picture tube (CRT assembly R, G, B) or exchanging and removing an anode cable.

When these kinds of operations are required, be sure to discharge anode voltage following the procedure of "Discharge of anode voltage", page 7.

The anode cables of the CRT assembly R, G, and B in PROJECTION MONITOR RECEIVER are connected in series as shown in Fig. 10-1.

When replacing the CRT assembly, the anode cable have to be cut.

Note : Since the anode cables for the CRT assembly to service supplies are only available in half lengths, either cut longer lengths, or join older lengths of cable to ensure that the original cable length is used.

Table 10-1 Cable disconnecting methods

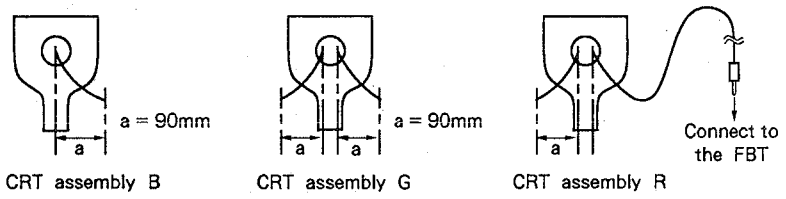
Cable	Replacement CRT assembly		
	When CRT assembly B is replaced	When CRT assembly G is replaced	When CRT assembly R is replaced
Cable ⓐ	——	——	Disconnect the anode cable from the FBT. (Refer to section "9.20 Anode cable connection and disconnection".)
Cable ⓑ	Leave as is	Cut a place 20mm from the exact center towards the CRT assembly G	Cut a place 20mm from the exact center towards the CRT assembly R
Cable ⓒ	Cut a place 20mm from the exact center towards the CRT assembly B	Cut a place 20mm from the exact center towards the CRT assembly G	Leave as is

Note : Do not cut other cables by mistake.

10.1 WHEN REPLACING THE CRT ASSEMBLY

Perform the replacement after discharged the anode voltage as described in section "4. Discharge of anode voltage".

Each CRT assembly supplied as a spare part is as shown below.



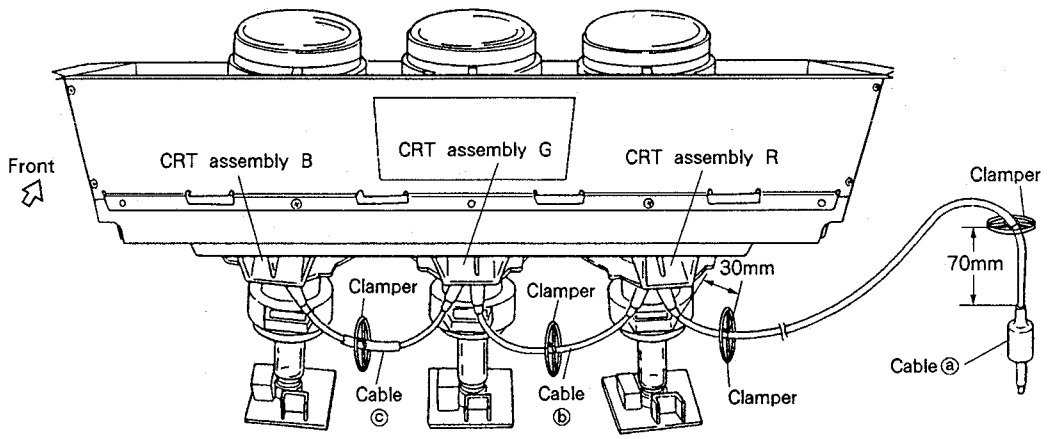


Fig. 10-1 Connection diagram of the each CRT assemblies

10.2 ANODE CABLE SHEATH PEELING

- Peel the sheath of the end of cut anode cable and new anode cable are as follows.
- The anode cable structure is outlined in Fig. 10-2. Note that the sheath consists of two layers.
- The method used to peel the sheath back is illustrated in Fig. 10-3. Use a cutter knife, taking care not to damage the core leads.

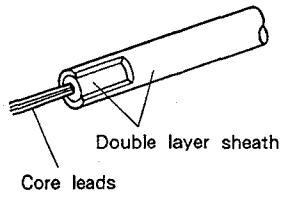


Fig. 10-2 Anode cable structure

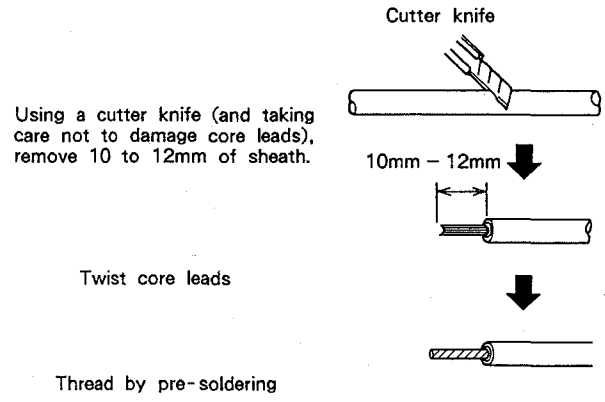


Fig. 10-3 Anode cable sheath peeling

10.3 ANODE CABLE JOINING PROCEDURE

- Join the cut anode cable and the new anode cable to restored as shown in Fig. 10-1. Also, when replacing the FBT, refer to section 9.20 "Anode cable connection and disconnection".
- Slip two silicon tubes (silicon tubes A and B in Fig. 10-4) onto the anode cables before making the join.
- Leave the silicon binder to harden overnight.
- The silicon binder is applied to guard the cable core leads from external air. Apply binder liberally. After completing the joint (at step ⑩ in Fig. 10-4-1 thru 3), make a hole in the silicon binder and check that the tube interior cannot be seen.

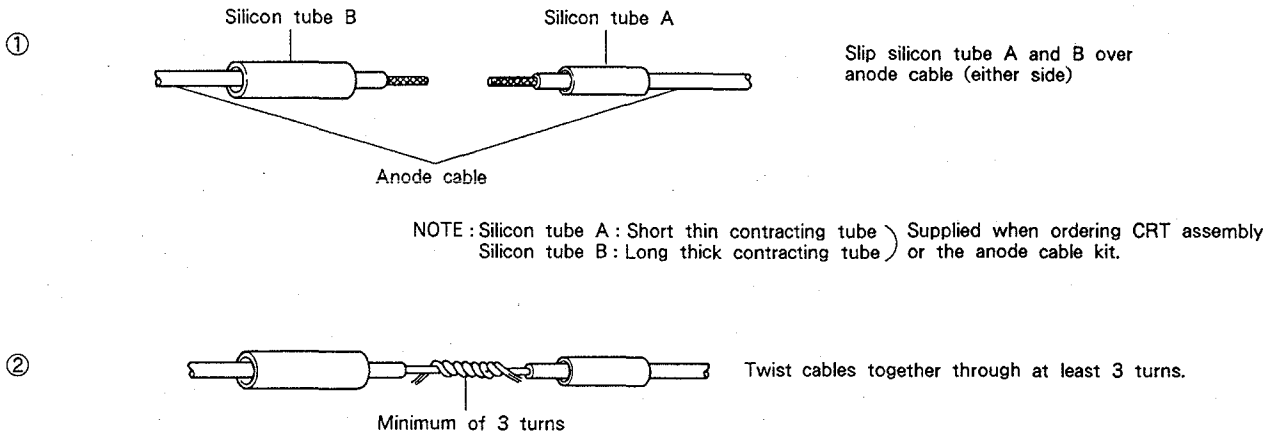
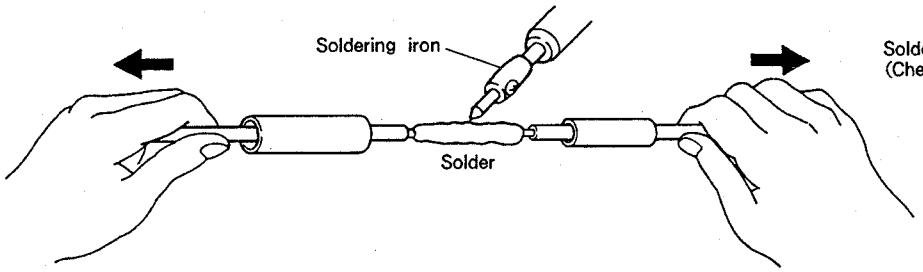


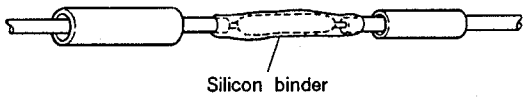
Fig. 10-4-1 Anode cable joining procedure (1)

③



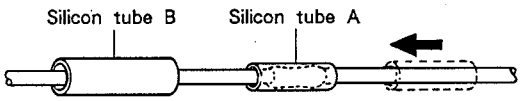
Solder the joint, and pull at both ends.
(Check against faulty soldering.)

④



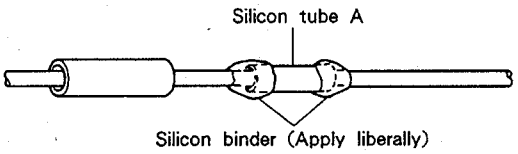
Apply silicon binder liberally.
(Cover the entire soldered section
and remaining bare core leads.)

⑤



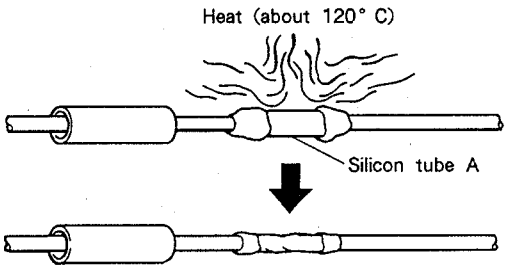
Cover the silicon binder section with silicon tube A.
(With the center of the silicon tube A corresponding
to the binder section)

⑥



Apply liberal amounts of silicon binder to
both ends of silicon tube A

⑦

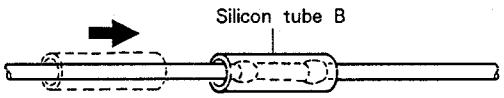


Apply heat (about 120° C) to contract silicon tube A.

Note : Use an industrial drier or soldering iron
as the heat source.

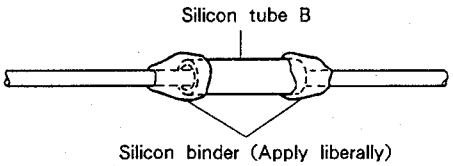
Check that the silicon binder has been applied
evenly without air pockets etc. If there are any
pockets etc, apply additional silicon binder.

⑧



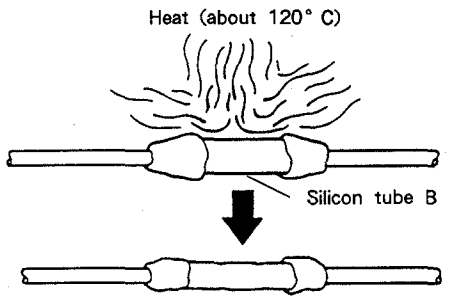
Slip silicon tube B over silicon tube A.
(With the center of silicon tube B also
corresponding to the binder section)

⑨



Apply liberal amounts of silicon binder
to both ends of silicon tube B.

Fig. 10-4-2 Anode cable joining procedure (2)

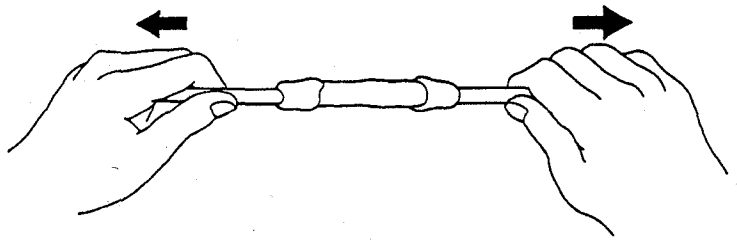


⑩

Apply heat (about 120° C) to contract silicon tube B.

Note : Use an industrial drier or soldering iron as the heat source.

Check that the silicon binder has been applied evenly without air pockets etc. If there are any pockets etc, apply additional silicon binder.



⑪

Gently tug both ends to check that the cables do not separate.

Fig. 10-4-3 Anode cable joining procedure (3)

11. HOW TO CLEAN

Note : Avoid fingerprints on the optical system parts such as the lens and mirror so be sure not to hold them with rear hand.

11.1 HOW TO CLEAN LENS AND MIRROR

When cleaning the lens and mirror, use the following specified cloth.

Cleaning cloth····SAVINA MINIMAX (Manufactured by Kanebo Textile (Co LTD), etc.

1. Be sure to remove sand dust with an air brush, etc.
2. When it is stained slightly, breathe upon it and wipe away with the specified cleaning cloth.
   For other stains than the above, wipe the stains away with the specified cloth into which a cleaning liquid has been soaked.

Cleaning liquid·····LENS LUSTER (Manufactured by Edmund Scientific Co.), etc.

11.2 HOW TO CLEAN SCREEN

When cleaning the screen, use a soft cloth so as not to damage the screen.

1. Wipe the stain away with a diluted neutral detergent soaked cloth.
2. Wipe the detergent away with a water soaked cloth.
3. Wipe the screen with a dry cloth to remove moisture on the screen.

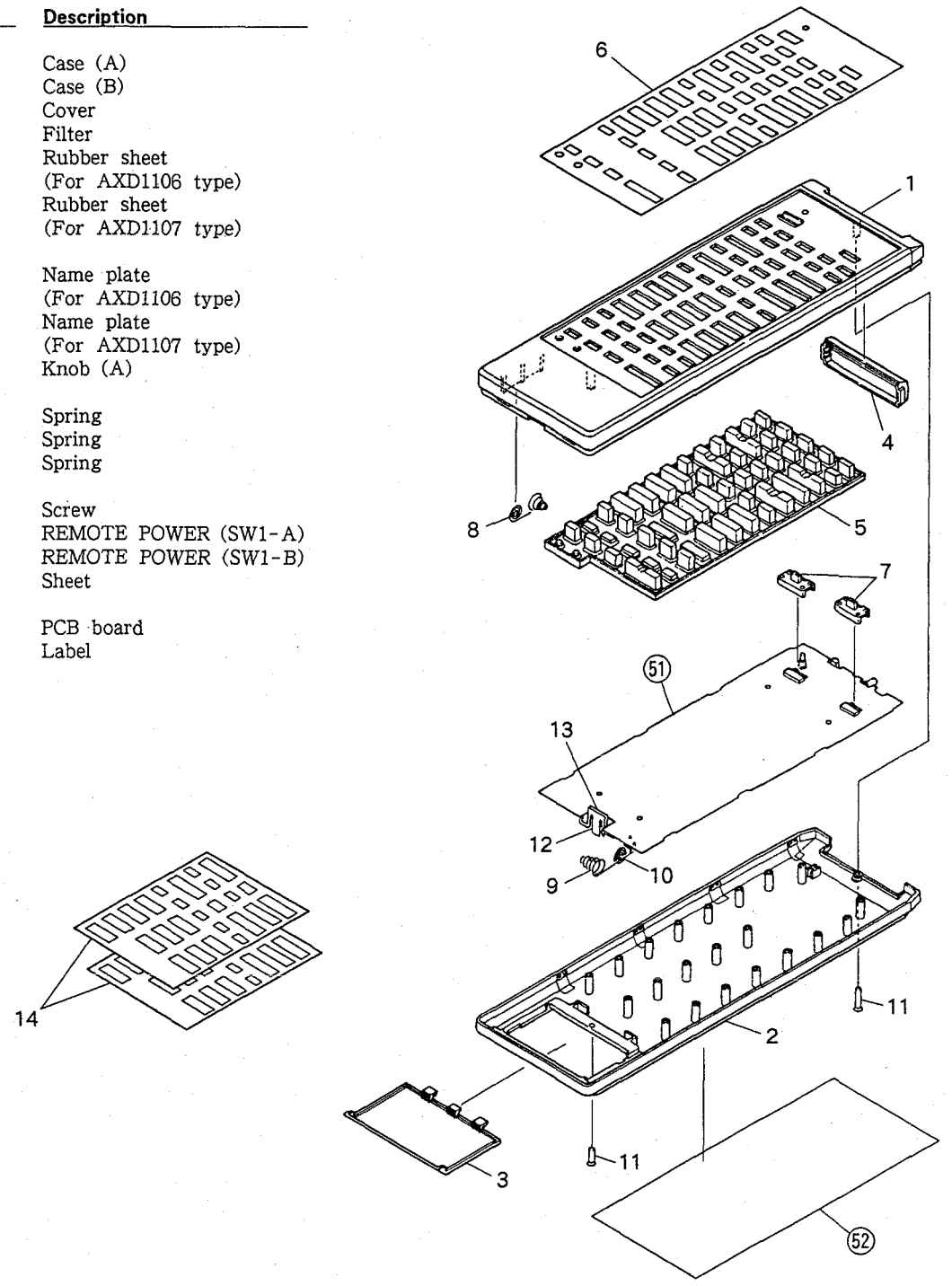
Note : Absolutely do not use alcohol, benzine, thinner, etc. for cleaning in order not to wipe away the black print on the surface.

12. REMOTE CONTROL UNIT (AXD1106) (AXD1107)

12.1 EXPLODED VIEWS AND PARTS LIST

NOTES :
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

Mark	No.	Part No.	Description
	1	AZA1157	Case (A)
	2	AZA1137	Case (B)
	3	AZA1138	Cover
	4	AZA1139	Filter
	5	AZA1195	Rubber sheet (For AXD1106 type)
		AZA1198	Rubber sheet (For AXD1107 type)
	6	AZA1196	Name plate (For AXD1106 type)
		AZA1199	Name plate (For AXD1107 type)
	7	AZA1142	Knob (A)
	8	AZB1268	Spring
	9	AZB1269	Spring
	10	AZB1270	Spring
	11	AZA1146	Screw
	12	AZS1084	REMOTE POWER (SW1-A)
	13	AZS1083	REMOTE POWER (SW1-B)
	14	AZA1161	Sheet
	51		PCB board
	52		Label



12.2 ELECTRICAL PARTS LIST

NOTES :
- Parts without part number cannot be supplied.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5 %, and K = 10 %).

560 Ω → 56 × 10^1 → 561 ····· RD1/4PS 5 6 1 J
47k Ω → 47 × 10^3 → 473 ····· RD1/4PS 4 7 3 J
0.5 Ω → 0R5 ····· RN2H 0 R 5 K
1 Ω → 010 ····· RS1P 0 1 0 K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k Ω → 562 × 10^1 → 5621 ····· RN1/4SR 5 6 2 1 F

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC1	PDG045
	IC2	AZC1232
	IC3	AZC1231
	Q1	AZC1229
	Q2	AZC1230
	D2	AZC1224
	D4	AZC1225
	D5	AZC1226
	D6 – D12	AZC1228

SWITCHES

Mark	Symbol & Description	Part No.
	S01,S03,S04,S06 Slide switch (SR RECALL/USE/LEARN, VDP/VCR/AUX)	AZS1074
	SW1-A (REMOTE POWER)	AZS1084
	SW1-B (REMOTE POWER)	AZS1083

CAPACITORS

Mark	Symbol & Description	Part No.
	C1,C2 (100μF/6.3V)	AZC1253
	C3 (10μF/16V)	AZC1254
	C4,C5 (100pF)	AZC1222
	C6,C8 – C10 (0.01μF)	AZC1220
	C7 (1000pF)	AZC1221

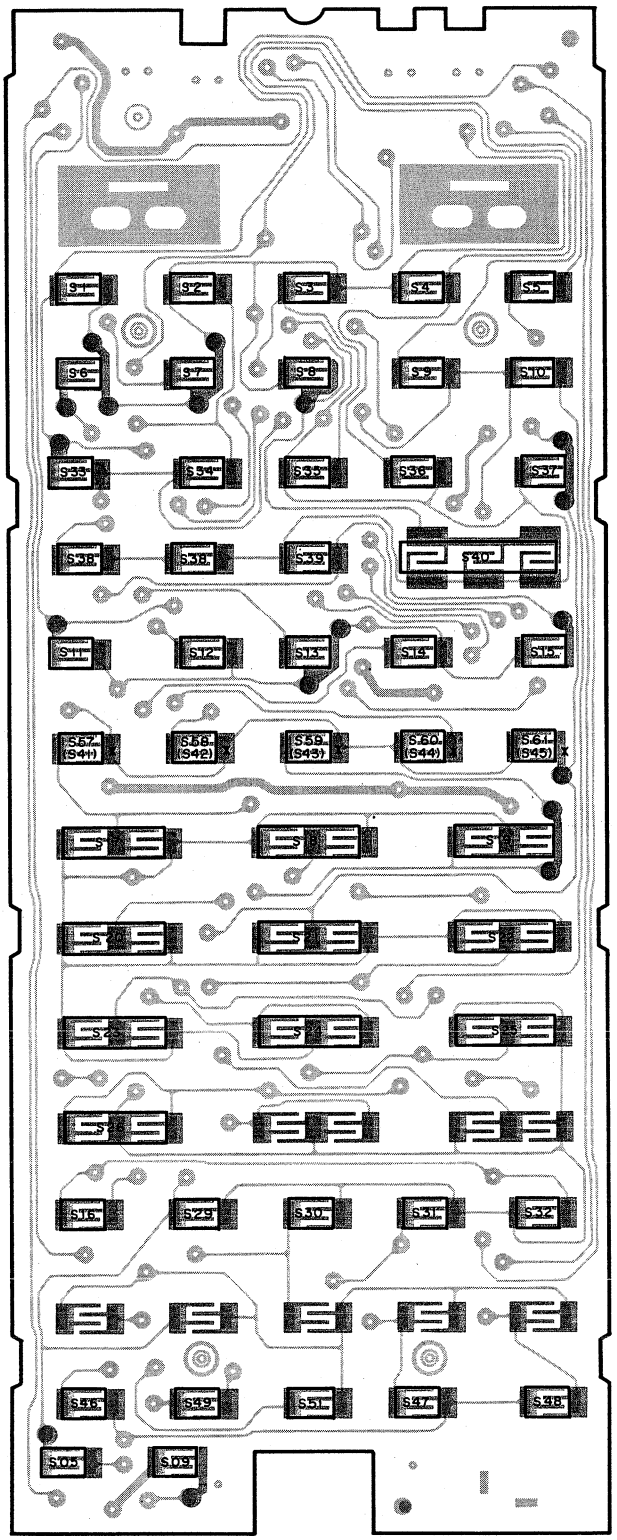
RESISTORS

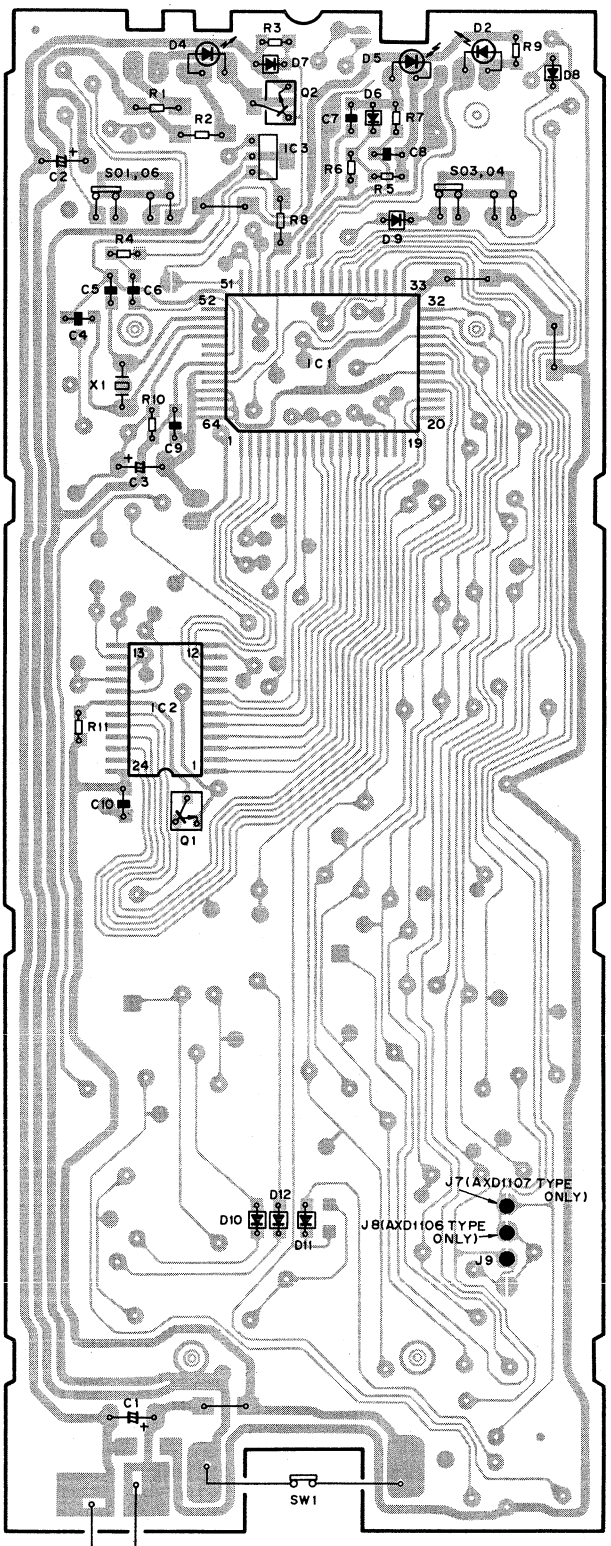
Mark	Symbol & Description	Part No.
	R2 (2.7Ω)	AZC1219
	R3 (100kΩ)	AZC1210
	R4 (680Ω)	AZC1217
	R5 (8.2kΩ)	AZC1214
	R6 (4.7kΩ)	AZC1215
	R7 (33kΩ)	AZC1211
	R8 (3.3MΩ)	AZC1218
	R9 (1kΩ)	AZC1216
	R10 (10kΩ)	AZC1213
	R11 (22kΩ)	AZC1212

OTHERS

Mark	Symbol & Description	Part No.
	X1 (2.0MHz)	AZC1223

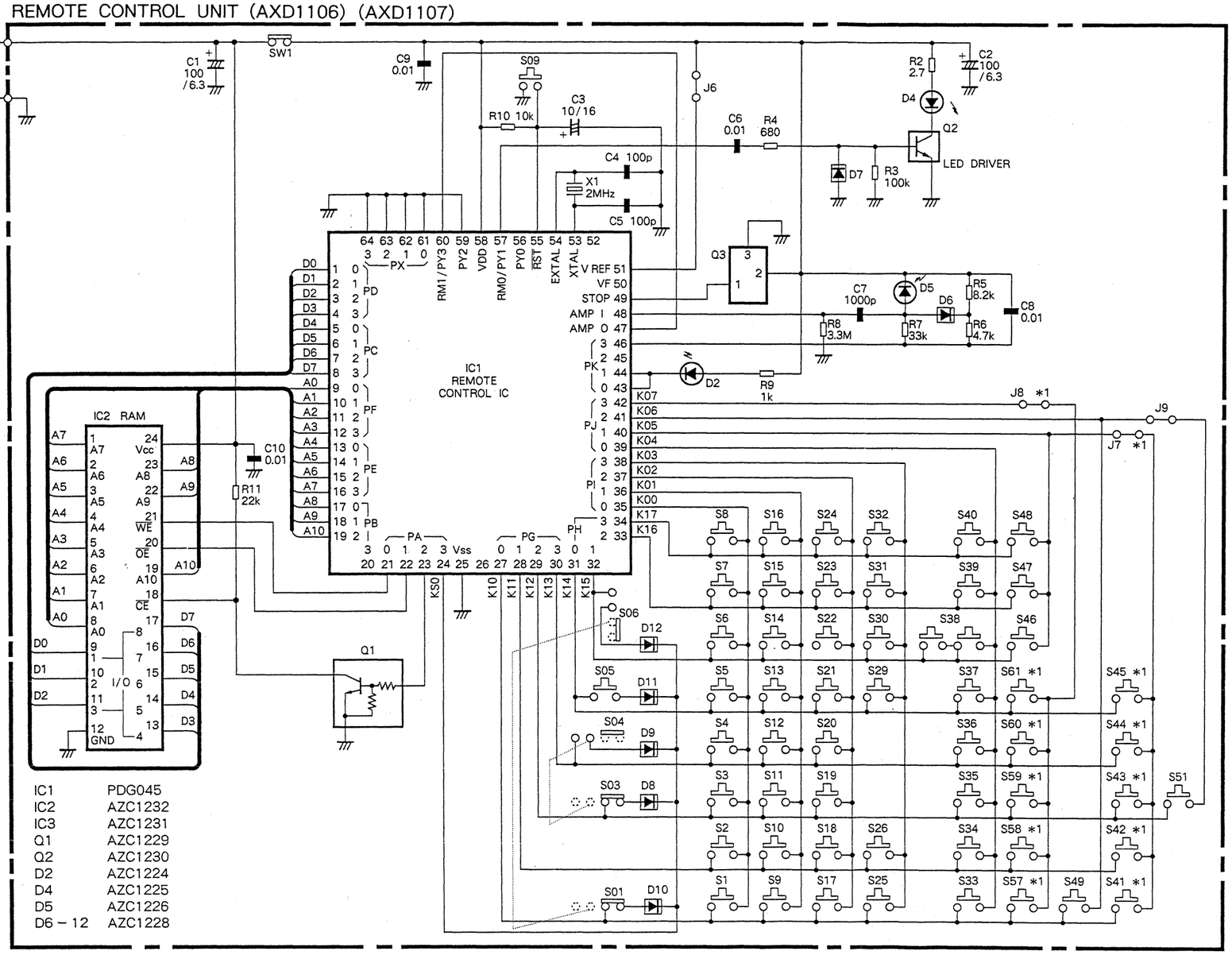
12.3 P.C. BOARD PATTERN





Note :
* : Value in ( ) is SW No. for AXD1107 type.

12.4 SCHEMATIC DIAGRAM



IC1	PDG045
IC2	AZC1232
IC3	AZC1231
Q1	AZC1229
Q2	AZC1230
D2	AZC1224
D4	AZC1225
D5	AZC1226
D6 – 12	AZC1228

1. RESISTORS :
   Indicated in Ω, 1/4W, 1/6W and 1/8W, ± 5 % tolerance unless otherwise noted k ; kΩ, M ; MΩ, (F) ; ± 1 %, (G) ; ± 2 %, (K) ; ± 10 %, (M) ; ± 20 % tolerance.

2. CAPACITORS :
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.

3. OTHERS :
   ➡ ; Signal route.
   ⊘ ; Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   ※ marked capacitors and resistors have parts numbers.

   This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

4. SWITCHES : (The underlined indicates the switch position)
   SW1 : REMOTE POWER

	VDP	VCR1	VCR2
S01	ON	OFF	OFF
S06	OFF	OFF	ON

	SR RECALL	USE	LEARN
S03	ON	OFF	OFF
S04	OFF	OFF	ON

S05 : M – CLR
S09 : RESET

S1 : TV
S2 : VDP
S3 : VCR1
S4 : VCR2 — POWER
S5 : SLEEP
S6 : TV
S7 : VDP
S8 : VIDEO 1
S9 : VIDEO 2
S10 : VIDEO 3 — INPUT SELECT
S11 : –
S12 : + — TV CHANNEL
S13 : MUTE
S14 : –
S15 : + — MASTER VOLUME
S16 : MTS
S17 : 1
S18 : 2
S19 : 3
S20 : 4
S21 : 5
S22 : 6
S23 : 7
S24 : 8
S25 : 9
S26 : 0
S29 : DPO

S30 : CH RETURN
S31 : ANT
S32 : DISPLAY
S33 : ⏮/– S34 : ⏭/+ — VCR/CH
S35 : ⏸/⏯
S36 : ◀◀
S37 : ▶▶
S38 : REC
S39 : ■/▲
S40 : ▶
S41 :
S42 :
S43 : MODE — SURROUND
S44 : – S45 : + — VOLUME
S46 : STD/AV MEMORY
S47 : ◁ S48 : ▷ — ADJUST
S49 : PICTURE
S51 : SOUND
S57 : PINP
S58 : SWAP
S59 : SIZE
S60 : SHIFT
S61 : INPUT

NOTE :

: Indicates a chip resistor.
: Indicates a chip capacitor.
: Indicates a chip transistor.
: Indicates a chip diode.

*1

PARTS NO. / TYPE	J8 and S57 – S61	J7 and S41 – S45
AXD1106	Used	Not used
AXD1107	Not used	Used

12.5 IC DESCRIPTION

■ PDG045

Remote control microcomputer

● Pin Function

Pin	I/O	Pin name	Function	Active
1	I/O	PD0	I/O 1	–
2		PD1	I/O 2	
3		PD2	I/O 3	
4		PD3	I/O 4	
5		PC0	I/O 5	
6		PC1	I/O 6	
7		PC2	I/O 7	
8		PC3	I/O 8	
9	O	PF0	A0	H
10		PF1	A1	
11		PF2	A2	
12		PF3	A3	
13		PE0	A4	
14		PE1	A5	
15		PE2	A6	
16		PE3	A7	
17		PB0	A8	
18		PB1	A9	
19		PB2	A10	
20		PB3	N.C.	
21	O	PA0	SRAM WE (write enable)	L
22		PA1	SRAM OE (output enable)	
23		PA2	SRAM CE (chip enable)	H
24		PA3	Scan-signal output for diode switches	L
25		Vss	Ground	
26		NC	N.C.	
27	I	PG0	Key-scan input	L
28		PG1		
29		PG2		
30		PG3		
31		PH0		
32		PH1		
33		PH2		
34		PH3		

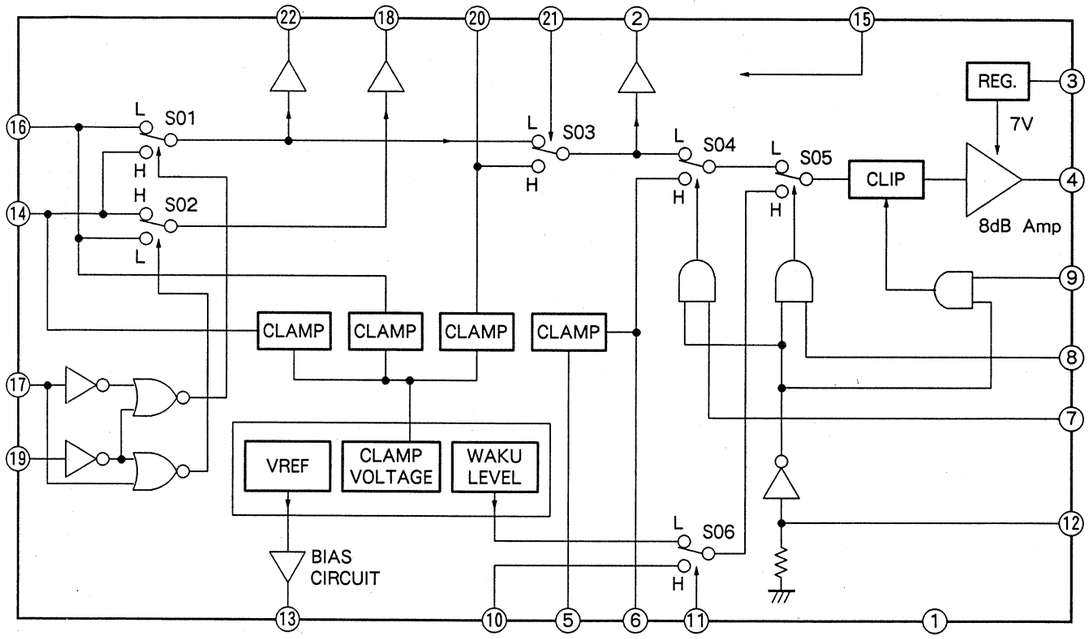
Pin	I/O	Pin name	Function	Active
35	O	PI0	Key-scan strobe output	L
36		PI1		
37		PI2		
38		PI3		
39		PJ0		
40		PJ1		
41		PJ2		
42		PJ3		
43	O	PK0	Output for LED	H
44		PK1		
45		PK2	N.C.	
46		PK3	Control for photo-diode power supply	
47	O	AMP0	Analog amp. output for remote control signal.	H
48	I	AMP1	Analog amp. input for remote control signal.	–
49	I	STOP	Control input for hardware stop	L
50		VF	N.C.	
51	O	VREF	Zener for descrease-voltage detection	H
52		N.C	N.C.	
53		XTAL	Connect the ceramic resonator for clock osillation (2MHz)	
54		EXTAL		
55	I	$\overline{RST}$	Reset input	L
56		PY0	N.C.	
57	O	RM0/PY1	Remote-control output	H
58		V_{DD}	Power supply voltage (+3V)	
59	I	PY2	Ground	
60		RM1/PY3	Remote-control input	H
61		PX0	Ground	
62		PX1		
63		PX2		
64		PX3		

13. IC DESCRIPTION

■ HA118088NT

MAIN/SUB Switching for P. in P.

● Block diagram



CONTROL PIN No. / SWITCH POSITION / SWITCH No.		17	19	21
S01	H	H	H	*
	L	L	H	*
		H	L	*
		L	L	*
S02	H	L	H	*
	L	H	H	*
		L	L	*
		H	L	*
S03	H	*	*	H
	L	*	*	L

CONTROL PIN No. / SWITCH POSITION / SWITCH No.		7	8	11	12
S04	H	*	H	*	L
	L	*	L	*	L
		*	*	*	H
S05	H	H	*	*	L
	L	L	*	*	L
		*	*	*	H
S06	H	*	*	H	*
	L	*	*	L	*

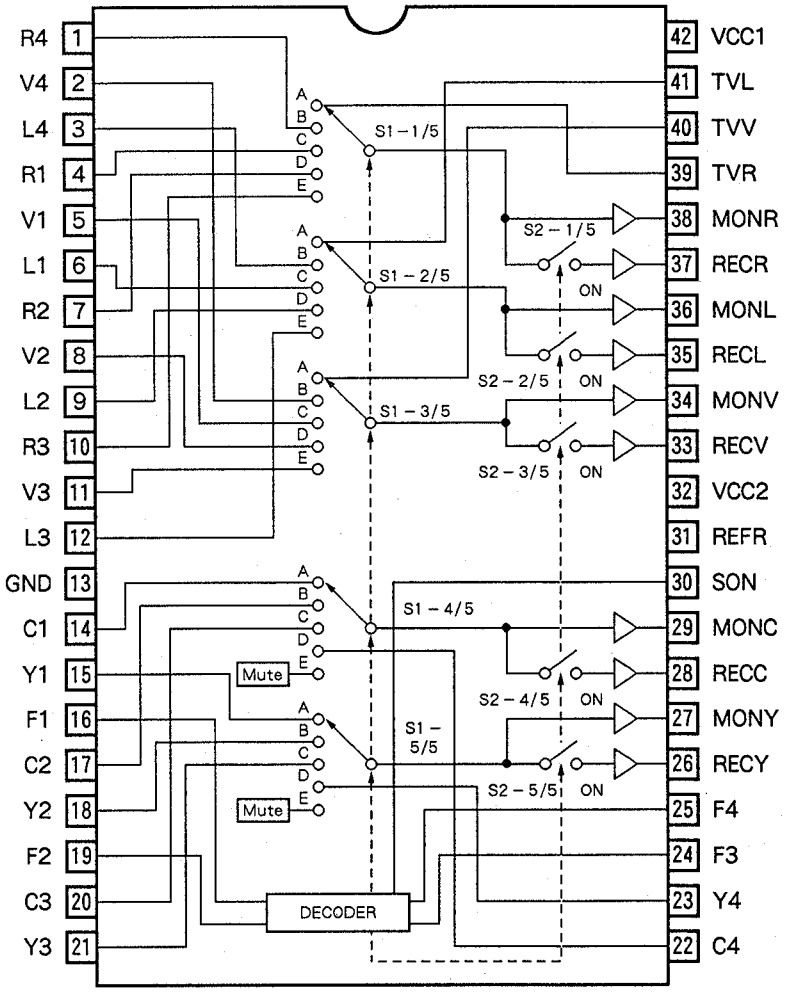
Note : • LOGIC LEVEL "H" ··· 5V, "L" ··· 0V
• * mark···Don't care

■ PA0040

AV function selector

CONTROL PIN No. / SWITCH POSITION / SWITCH No.		Pin 16 (F1)	Pin 19 (F2)	Pin 24 (F3)	Pin 25 (F4)
S1 (1/5 – 5/5)	A	H	H	L	L
	B	*	*	H	
	C	H	L	L	
	D	L	H	L	
	E	L	L	L	
S2 (1/5 – 5/5)	OFF	L	H	L	
	ON	H	H	L	
		*	*	H	
		H	L	L	
		L	L	L	

Note : • LOGIC LEVEL "H" ····· 5V, "L" ····· 0V
• * mark·····Don't care



● Pin Function

Pin	Pin name	Function	Pin	Pin name	Function
1	R4	Audio signal input 4 of R ch.	22	C4	Chrominance signal input 4.
2	V4	Video signal input 4.	23	Y4	Liminance signal input 4.
3	L4	Audio signal input 4 of L ch.	24	F3	Mode selection terminal 3.
4	R1	Audio signal input 1 of R ch.	25	F4	Mode selection terminal 4.
5	V1	Video signal input 1.	26	RECY	Luminance signal output for RECORD.
6	L1	Audio signal input 1 of L ch.	27	MONY	Luminance signal output for MONITOR.
7	R2	Audio signal input 2 of R ch.	28	RECC	Chrominance signal output for RECORD.
8	V2	Video signal input 2.	29	MONC	Chrominance signal output for MONITOR.
9	L2	Audio signal input 2 of L ch.	30	SON	Discrimination terminal of S input signal.
10	R3	Audio signal input 3 of R ch.	31	REFR	Connect the reference resistor.
11	V3	Video signal input 3.	32	VCC2	Power supply terminal.
12	L3	Audio signal input 3 of L ch.	33	RECV	Video signal output for RECORD.
13	GND	Ground.	34	MONV	Video signal output for MONITOR.
14	C1	Chrominance signal input 1.	35	RECL	Audio signal output of L ch for RECORD.
15	Y1	Luminance signal input 1.	36	MONL	Audio signal output of L ch for MONITOR.
16	F1	Mode selection terminal 1.	37	RECR	Audio signal output of R ch for RECORD.
17	C2	Chrominance signal input 2.	38	MONR	Audio signal output of R ch for MONITOR.
18	Y2	Luminance signal input 2.	39	TVR	Audio signal input of TV R ch.
19	F2	Mode selection terminal 2.	40	TVV	Video signal input of TV.
20	C3	Chrominance signal input 3.	41	TVL	Audio signal input of TV L ch.
21	Y3	Liminance signal input 3.	42	VCC1	Power supply terminal.

■ PA0036

Convergence Correction Signal Generator

● Pin Function

Pin	Pin name	Function	Pin	Pin name	Function
1	HBI	H. blanking pulse input.	22	HSK	V. sawtooth wave × 1/2H sawtooth wave output
2	VBI	V. blanking pulse input.			
3	VSO0	V. sawtooth wave output.	23	VSK	1/2V. sawtooth wave × H. sawtooth wave output
4	VSBI	Buffer input of V. sawtooth wave.			
5	VOPI	V. OP amp. input.	24	KEY	V. sawtooth wave × H. sawtooth wave output.
6	VPO	V. OP amp. output.			
7	VPI	V. parabolic wave input.	25	HSI3	H. sawtooth wave input.
8	V4	V. 4th wave output.	26	HSO1	H. sawtooth wave output.
9	MPXI1	MPX input.	27	HSI2	H. sawtooth wave input.
10	MPXI2		28	HSI1	
11	MPXO	MPX output.	29	H3I	H. 3rd wave input.
12	VSI1	V. sawtooth wave input.	30	H3O	H. 3rd wave output.
13	VSI2		31	HPI	H. parabolic wave input.
14	VSO	V. sawtooth wave output.	32	HPO	H. OP amp. output.
15	V3	V. 3rd wave output.	33	HOPI	H. OP amp. input.
16	SLIN1	1/2H 3rd wave output.	34	HSO0	H. sawtooth wave output.
17	SLIN2		35	HBC	Capacitor for correct the H. sawtooth wave.
18	VSH3	V. sawtooth wave × H. 3rd wave output	36	VCC	Power supply voltage.
19	VPHP	V. parabolic wave × H. parabolic wave output	37	HSC	Capacitor for integrate the H. sawtooth wave.
			38	GND	Ground.
20	VPHS	V. parabolic wave × H. sawtooth wave output	39	VSC	Capacitor for integrate the V. sawtooth wave.
			40	VEE	Power supply voltage.
21	VSHP	V. sawtooth wave × H. parabolic wave output	41	VI	V. blanking pulse input.
			42	HI	H. blanking pulse input.

■ HA19216

6 bit A/D Converter

● Pin Function

Pin	Pin name	Function	Pin	Pin name	Function
1	B6	Digital signal output (MSB)	10	V_{RB}	Reference voltage input of low level at the A/D convert.
2	OF	Digital signal (over flow) output.			
3	GND	Ground.	11	V_{IN}	Analog signal input.
4	NC	N.C.	12	Vcc	+5V power supply voltage.
5	CE2	Hi-impedance condition control input of digital signal output.	13	B1	Digital signal output. (LSB)
6	$\overline{CE1}$		14	B2	Digital signal output.
7	CLK	Colck input of converter.	15	B3	
8	PHS	Input terminal of clock phase switching.	16	V_{RM}	Correction input of reference voltage. Apply voltage when rectifying the linearity.
9	V_{RT}	Reference voltage input of High level at the A/D convert.	17	B4	Digital signal output.
			18	B5	

■ AN5302K

Video, Chroma and Deflection signal processor

● Pin Function

Pin	Function	Pin	Function
1	Ground for vertical section.	27	Ys input.
2	Detection filter of black level.	28	B input.
3	Composite video input 1.	29	G input.
4	Horizontal sync. separation input.	30	R input.
5	Vertical sync. separation input.	31	AIC filter and tint correction ON/OFF.
6	Vertical output.	32	Tint phase adjustment.
7	Capacitor of vertical sawtooth wave.	33	Ground for video and chroma sections.
8	Vertical feedback input.	34	3.58MHz oscillation.
9	Vertical pulse output.	35	Power supply voltage 1 (VCC 1).
10	Vertical integrate filter.	36	Power supply voltage 2 (VCC 2).
11	Vertical sync. separation input.	37	Tint control.
12	High voltage detection input (Hold down input).	38	White-peak limit adjustment.
13	H. AFC filter.	39	Start point adjustment of black level.
14	Reference voltage of hold down.	40	Color control.
15	FBP input for phase comparison.	41	ACC detection filter.
16	Synchronous detection filter.	42	Chroma signal input.
17	504kHz (32fH) osillation.	43	Delay time adjustment.
18	Power supply voltage 3 for horizontal section.	44	Brightness control.
19	H. blanking pulse input.	45	Adjustment of DC regenerate quantity.
20	Ground for horizontal section.	46	Y signal input.
21	H. drive pulse output.	47	Capacitor for Y clamp.
22	High voltage detection input (shut down input).	48	Y/C separation output 1 (Y).
23	Y output.	49	Contrast control.
24	B − Y output.	50	Y/C separation output 2 (C).
25	G − Y output.	51	Picture quality control.
26	R − Y output.	52	Composite video input 2 (1H delay).

■ HA11544

High Speed Type Switch

● Pin Function

Pin	Pin name	Function	Pin	Pin name	Function
1	VCC	+5V Power supply voltage.	9	IN (B − Y)	(B − Y) signal input.
2	OUT	Output terminal.	10	V (CENTER)	Reference voltage input for A/D converter.
3	SW − Y	Y signal control.	11	IN (R − Y)	(R − Y) signal input.
4	SW − VIDEO	VIDEO signal control.	12	IN (VIDEO)	VIDEO signal input.
5	SW − (R − Y)	(R − Y) signal control.	13	IN (Y)	Y signal input.
6	SW − (B − Y)	(B − Y) signal control.	14	V_{REF} −	Reference voltage input for A/D converter.
7	CLAMP	Clamp pulse input.	15	V_{REF} +	Reference voltage input for A/D converter.
8	GND	Ground.	16	GND	Ground.

■ HA19507NT

6 bit D/A Converter

● Pin Function

Pin	Pin name	Function	Pin	Pin name	Function
1	REXT	Connect the resistor for 4fsc oscillatoin.	16	B3	D/A converter digital input. ↑ (LSB)
2	PD	Output terminal of fsc phase detector.	17	B2	
3	fsc IN	Sub-carrier (fsc) input.	18	B1	
4	COMP	Connect the capacitor for the phase compensation of OP amp.	19	VD	Value-added video signal input.
			20	DGND	Digital ground.
5	VREF	Reference voltage input for D/A converter.	21	DVCC	+5V digital power supply voltage.
6	BLK LEVEL	Blanking level input.	22	AGND	Analog ground.
7	NC	N. C.	23	AOUT	D/A converter output.
8	VBLK	V. blanking signal input.	24	AVCC	+5V analog power supply voltage.
9	NC	N. C.	25	fsc	fsc signal input.
10	AGND	Analog ground.	26	4fsc	4fsc signal output.
11	3BIT	3 bit/6 bit switch for D/A converter resolution.	27	DVCC	+5V digital power supply voltage.
12	CLK	D/A converter clock input.	28	CAP2	Connect the capacitor for 4fsc oscillation.
13	B6	D/A converter digital input. (MSB) ↓	29	CAP1	
14	B5		30	VCO	Control input for 4fsc VCO oscillation frequency.
15	B4				

■ HA19508A

6 bit D/A Converter

● Pin Function

Pin	Pin name	Function	Pin	Pin name	Function
1	A Vcc	+5V analog power supply input.	9	B3	D/A converter digital input. ↑ (LSB)
2	COMP	Connect the capacitor for the phase compensation of OP amp.	10	B2	
			11	B1	
3	REF	Reference voltage input.	12	D Vcc	+5V digital power supply voltage.
4	CLK	Clock input.	13	D GND	Digital ground.
5	A GND	Analog ground.	14	A GND	Analog ground.
6	B6	D/A converter digital input. (MSB) ↓	15	A Vcc	+5V analog power supply voltage.
7	B5		16	DAC OUT	D/A converter output.
8	B4				

■ UPD6145C – 001

On screen display (OSD)

● Pin Function

Pin	Pin name	I/O	Function	Active
1	$\overline{CS}$	I	Normal operation is perfomed with this terminal set to "L" level. With this terminal set to "H" level, the shift clock is input to CLK, and the strobe signal input to STB is inhibited.	L
2	CLK		Terminal that inputs the clock for data read-in. Data is read in from the DATA terminal at the leading edge of the clock.	⊓↓
3	STB		The terminal for strobe input after serial data input. 8-bit data is read at the leading edge of the pulse applied to the STB terminal. If the 8-bit data is a character data, the data address will be increased by 1 at the trailing edge of the pulse.	⊓↓
4	DATA		Terminal that inputs control data. Data is read in with the timing of the clock connected to the CLK terminal.	H/L
5	VDD	—	+5V input terminal.	—
6	$\overline{CKOUT}$	O	Inverted output of OSC OUT. To be used for the oscillation frequency check.	—
7	OSCOUT		To be connected to the oscillation capacitor and coil.	—
8	OSCIN	I		
9	VSS	—	To be connected to the system GND.	—

Pin	Pin name	I/O	Function	Active
10	VMON	O	This terminal is set to "H" level when one of the VR, VG or VB character data output signal is set to "H" level.	H
11	VR		Terminal used to output the character data corresponding to R, G and B. Data is output with "active high."	H
12	VG			
13	VB			
14	VBLK		Terminal that output the blanking signal for out the video signal. Data is output with "active high".	H
15	TESTIN	I	Terminal for test clock input. (Normally, to be connected to VSS.)	H
16	$\overline{VSYNC}$		Terminal for the vertical sync signal input. To be input with "active low".	L
17	$\overline{HSYNC}$		Terminal for the horizontal sync signal input. The oscillation occurs when $\overline{HSYNC}$ is set to "H" level, and is synchronized with the leading edge of $\overline{HSYNC}$. To be input with "active low."	L
18	HOLD		The oscillation stops when this terminal is set to "L" level. At this time, VR, VG, VB and VBLK are set to "L" level. (Normally this terminal should be set to "H" level.)	L

■ M6M80011AP

64 × 16 bit EEPROM

● Pin Function

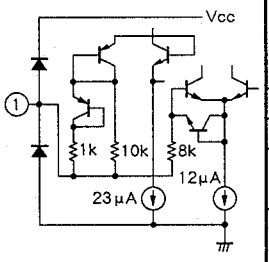
Pin	Pin name	I/O	Function	Active
1	$\overline{CS}$	I	• Selects the chip at the "L" level. At the "H" level, the built-in sequential controller is reset. Before each mode operation, this terminal is set to "H" once. • During the write operation (when the BUSY output is set to "L"), the write operation is continued regardless of the input to this terminal. • When the write operation is completed, the mode read-in is enabled after this terminal is set to "H". However, the "status output" can be read-in when the write operation is started and the sequential controller is reset, with this terminal staying at "L".	L
2	$\overline{SCK}$		• The input data is read at the leading edge of the clock. • The data is output at the trailing edge of the clock.	H/L
3	DI		• Data is input through this terminal.	H/L

Pin	Pin name	I/O	Function	Active
4	DO	O	• Data is output from this terminal. DI and DO can be connected.	H/L
5	VSS	—	Ground for system.	—
6	RESET	I	• When this terminal is set to "H", the sequential controller and the write circuit are reset, and the memory protect state is obtained. During the write operation, the operation is suspended if this terminal is set to "H".	H
7	RDY/$\overline{BUSY}$	O	• This terminal is set to "L" during the write operation. • Also set to "L" when the power is turned on or off. At this time, no input will be allowed to be read in.	L
8	VDD	—	+5V power supply terminal	—

■ CXA1124AS

US MPX Decoder

● Pin Function

Pin	Pin name	I/O	Function
1	SAP TC	O	Terminal that sets the time constants for the SAP carrier detection and the noise detection circuits. 
2	ST LED		Terminal for STEREO indicator drive. Open collector output.
3	SAP LED		Terminal for SAP indicator drive. Open collector output.
4	LED G	—	Ground for LED.
5	VC SAP	I	Terminal for SAP VCO oscillation frequency control. When DC power is applied to this terminal, the SAP VCO oscillation frequency varies. Normally a resistor or variable resistor is connected.
6	SAP OUT	O	Terminal that outputs the SAP FM detection.
7	M1	I	Terminal for mode control switching. For the mode matrix, refer to Table 13-1.
8	M2		
9	FMONO		Terminal for mode control switching. Inputs three values. Sets forced monaural mode, and controls ST. LED. For the mode matrix, refer to Table 13-1.
10	SMD		Terminal for mode control switching. Controls the SOUT terminal output. For the mode matrix, refer to Table 13-1.
11	FSAP		Terminal for mode control switching. For the mode matrix, refer to Table 13-1 and 13-2.
12	MUTE		Terminal for the MUTE control. When set to "H" level, all outputs are muted.
13	I SAP	O	Terminal that sets the reference current for the SAP system filter. By adjusting the current to this terminal, the cut-off frequency changes.
14	I LPF		Terminal that sets the reference current for the stereo system filter and dbx-TVNR system filter.By adjusting the current to this terminal, the cut-off frequency for each system changes.
15	I VCO		Terminal that sets the reference current for the stereo VCO and SAP VCO. By adjusting the current to this terminal, the oscillation frequency for each changes.
16	E SAP	I	Terminal that inputs the SAP signal from the external dbx-TV NR (optional)
17	R OUT	O	Terminal for R ch output.
18	L OUT		Terminal for L ch output.
19	S OUT	O	Terminal for sub-output. From this terminal, monaural signal or SAP (only when an external dbx-TVNR is connected) is output.
20	NR BPF	I	Monitor terminal for the dbx-TV block filter.
21	SAP IN		Terminal that inputs signal from SAP OUT (pin 6)
22	VE WGT		Weighted terminal for the variable de-emphasis control effective value detection circuit.
23	MAIN IN		Terminal that inputs signal (L + R) from MAIN OUT (pin 36)
24	ST IN		Terminal that inputs signal (L − R) from SUB OUT (pin 35)
25	VE TC	O	Terminal that sets the time delay constant for the variable de-emphasis control effective value detection circuit. By connection 3.3μF capacitor to this terminal, the standard time delay constant will be obtained.
26	VCA WGT		Weighted terminal for the VCA control effective value detection circuit.
27	VCA TC		Terminal that sets the time delay constant for the VCA control effective value detection circuit. By connecting 10μF capacitor to this terminal, the standard time delay constant will be obtained.
28	VCA IN	I	Terminal that inputs VCA. Inputs the variable de-emphasis output signal from pin 29 through the coupling capacitor.
29	VE OUT	O	Terminal that outputs the variable de-emphasis signal.
30	VE	—	Terminal for the variable de-emphasis integration.
31	GND		Ground terminal.
32	VCC		+9V power supply terminal.
33	VRS		Terminal for the reference voltage of the signal. The voltage is set to the half of the power supply vloltage.
34	I TIME	I	Terminal that inputs the timing current of the effective direct detection. The timing current determines the time delay constant for the detection circuit and the variable de-emphasis characteristics.
35	SUB OUT	O	Terminal that outputs L − R signal.
36	MA OUT		Terminal that outputs L + R signal.
37	PL INT1	I	Terminal for the loop filter integration of the pilot cancel circuit.
38	PL INT2		
39	COMP IN		Terminal that inputs the sound multiplex signal.
40	PC INT1	O	Terminal for the loop filter integration of the PLL in the stereo block.
41	PC INT2	I	
42	SAP BPF	O	Monitor terminal for SAP BPF.

- ＊H : 8.5V (Vcc − 0.5V) − 9V (Vcc)
- H : 2.0V − 9V (Vcc)
- M : 2.0V − 7V (Vcc − 2V)
- L : 0V (GND) − 0.8V
- By changing the FSAP (pin 11) setting, the SAP discriminant mode will change. (The LOUT and ROUT outputs will change.)
  ＊1 : FSAP····GND (automatic SAP discriminant mode selection)
  ＊2 : FSAP····Vcc (+9V) (fixed SAP discriminant mode)

Broardcast Mode	LED		Terminal			＊1 Output		＊2 Output	
	ST (Pin 2)	SAP (Pin 3)	M1 (Pin 7)	M2 (Pin 8)	FMONO (Pin 9)	LOUT (Pin 18)	ROUT (Pin 17)	LOUT (Pin 18)	ROUT (Pin 17)
MONO	OFF	OFF	L	L	—	L+R	L+R	L+R	MUTE
	OFF	OFF	L	H	—	L+R	L+R	MUTE	MUTE
	OFF	OFF	H	L	—	L+R	L+R	L+R	L+R
	OFF	OFF	H	H	—	MUTE	MUTE	MUTE	MUTE
MONO + SAP	OFF	ON	L	L	—	L+R	SAP	L+R	SAP
	OFF	ON	L	H	—	SAP	SAP	SAP	SAP
	OFF	ON	H	L	—	L+R	L+R	L+R	L+R
	OFF	ON	H	H	—	MUTE	MUTE	MUTE	MUTE
STEREO	ON	OFF	L	L	L	L	R	L+R	MUTE
	ON	OFF	L	L	M	L+R	L+R	L+R	MUTE
	OFF	OFF	L	L	＊H	L+R	L+R	L+R	MUTE
	ON	OFF	L	H	L	L	R	MUTE	MUTE
	ON	OFF	L	H	M	L+R	L+R	MUTE	MUTE
	OFF	OFF	L	H	＊H	L+R	L+R	MUTE	MUTE
	ON	OFF	H	L	L	L	R	L	R
	ON	OFF	H	L	M	L+R	L+R	L+R	L+R
	OFF	OFF	H	L	＊H	L+R	L+R	L+R	L+R
	ON	OFF	H	H	L. M	MUTE	MUTE	MUTE	MUTE
	OFF	OFF	H	H	＊H	MUTE	MUTE	MUTE	MUTE
STEREO + SAP	ON	ON	L	L	L	L+R	SAP	L+R	SAP
	ON	ON	L	L	M	L+R	SAP	L+R	SAP
	OFF	ON	L	L	＊H	L+R	SAP	L+R	SAP
	ON	ON	L	H	L	SAP	SAP	SAP	SAP
	ON	ON	L	H	M	SAP	SAP	SAP	SAP
	OFF	ON	L	H	＊H	SAP	SAP	SAP	SAP
	ON	ON	H	L	L	L	R	L	R
	ON	ON	H	L	M	L+R	L+R	L+R	L+R
	OFF	ON	H	L	＊H	L+R	L+R	L+R	L+R
	ON	ON	H	H	L. M	MUTE	MUTE	MUTE	MUTE
	OFF	ON	H	H	＊H	MUTE	MUTE	MUTE	MUTE

Table 13−1. Mode matrix

Broardcast Mode	SAP LED	Terminal		Output
		SMD (Pin 10)	FSAP (Pin 11)	SOUT (Pin 19)
• MONO	OFF	L	Vcc	L+R
		H	Vcc	＊Ext
• STEREO		L	GND	L+R
		H	GND	L+R
• MONO + SAP	ON	L	Vcc	L+R
		H	Vcc	＊SAP
• STEREO + SAP		L	GND	L+R
		H	GND	＊SAP

＊SAP : When an external dbx-TV (optional) is connected.
＊EXT : Signal input to pin 16 (ESAP).

Table 13−2. SMD function

● Operation description

① L + R (MAIN)
The sound multiplex signal is input from pin 39 (COMP IN). The SAP signal and telemetry signal are suppressed by STEREO LPF. Then the pilot is canceled. Finally, the L − R signal and SAP signal are removed by MAIN LPF, and the flat frequency response is obtained by the de-emphasis circuit and input to matrix.

② L − R (SUB)
The same as the L + R signal until pilot canceling. The L − R signal has no carrier signal, since it is modulated by the double-sideband amplitude modulation (DSB-AM) method using the suppressed carrier. Therefore, the carrier signal (pseudo sine curve) is re-generated by the pilot signal, and the L − R signal is demodulated by this signal. Finally, the high frequency residual portion is eliminated by SUB LPF, the flat frequency response is obtained, and the L − R signal is input to the dbx-TV block through the NRSW circuit.

③ SAP
SAP, as shown in Fig. 13-1, is an FM signal having carrier of 5fH. First only the SAP signal is picked up by SAP BPF, then it is detected in FM. Finally, the high frequency residual portion is eliminated by SAP LPF, the flat frequency response is obtained, and the signal is input to the dbx-TV block through the NRSW circuit.

④ Mode discrimination
Stereo discrimination is effectuated by detecting the pilot signal amplitude. SAP discrimination is effectuated by detecting the 5 fH carrier and noise around 20 kHz after detection in FM.

⑤ dbx-TV block
The SAP signal and L − R signal are input through pin 24 (ST IN) and pin 21. Then one of these signals is selected by the mode control in the NRSW circuit, and input to the dbx-TV block.
The signal input to this block is applied to the variable de-emphasis circuit via the fixed de-emphasis circuit. The signal output from the de-emphasis circuit is applied to VCA (voltage controlled amplifier) through an external capacitor. The output from VCA is finally input to the matrix after being converted from current to voltage by the operation amplifier. The transfer function of the variable de-emphasis circuit and the VCA gain are controlled by the effective value detection circuit. Each effective value detection circuit detects the effective value of the signal weighted as specified by the filter, and obtains the control signal.

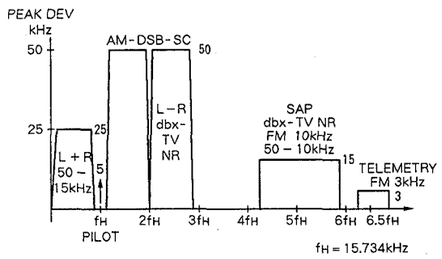


Fig.13−1 Base band spectrum

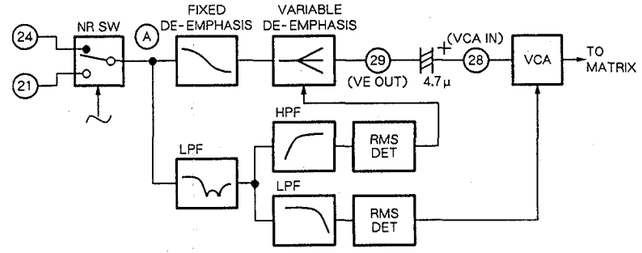


Fig. 13−2 dbx-TV Block

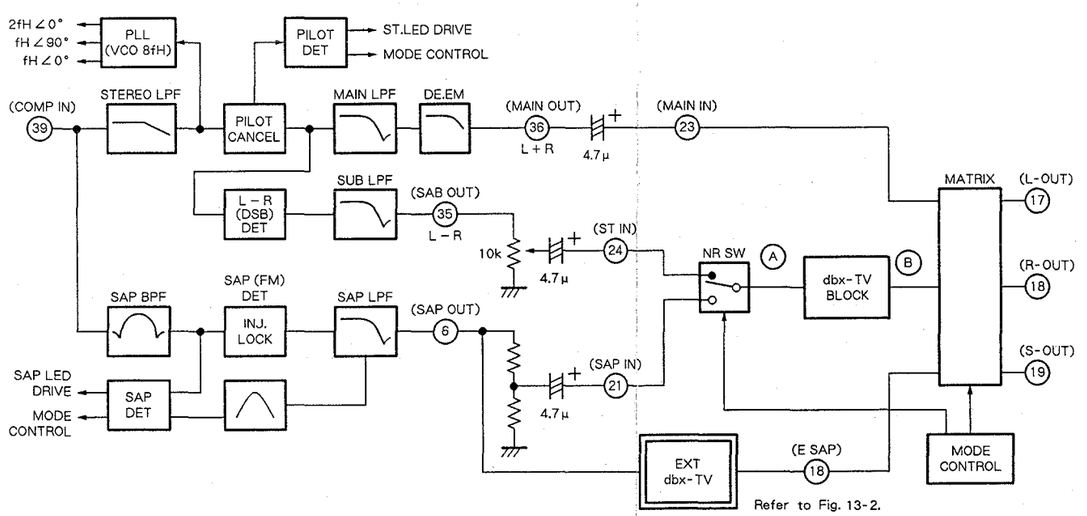


Fig. 13−3 Block diagram

■ HD49728

Memory Controller

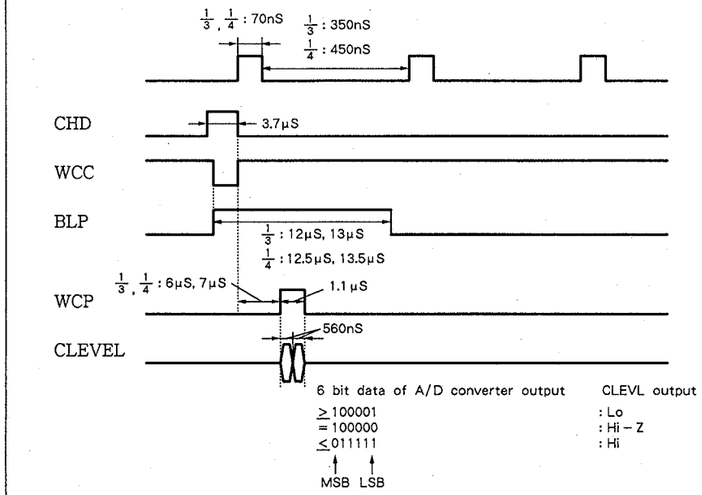
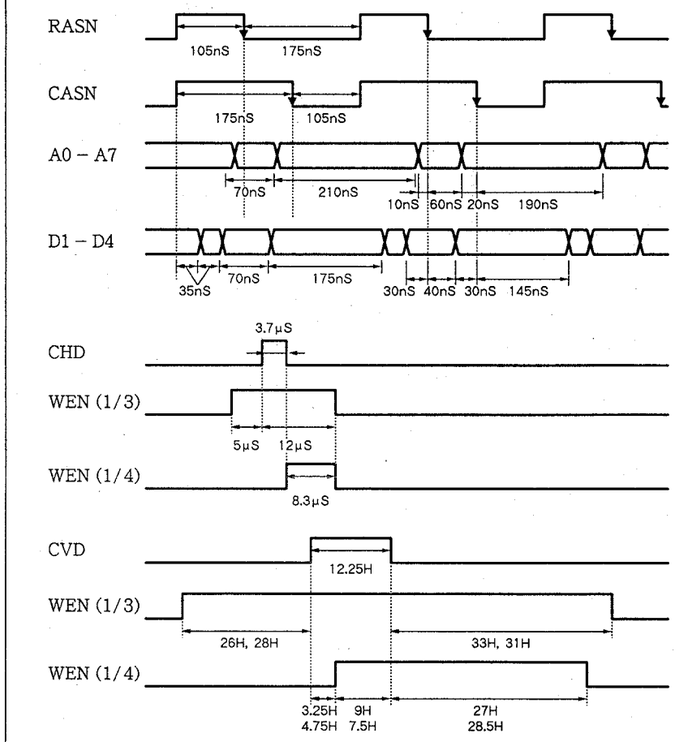
● Pin Function

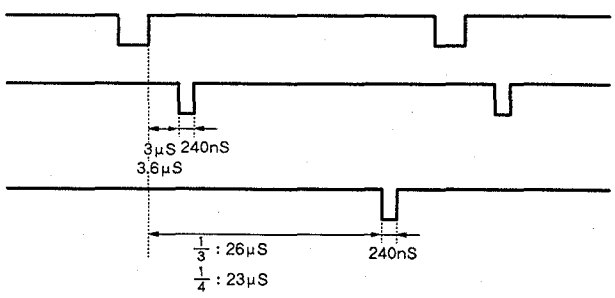
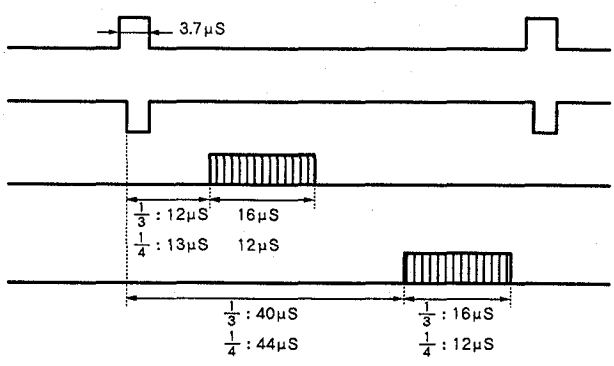
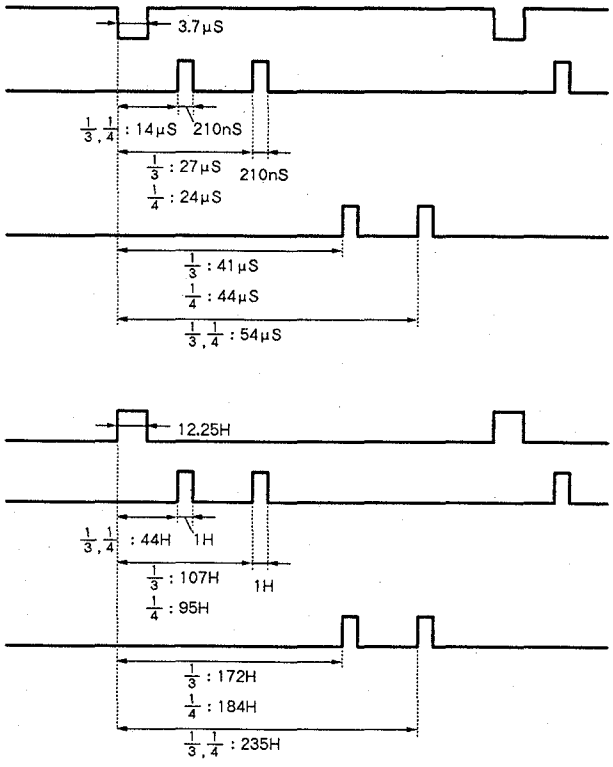
Pin	Pin name	I/O	Function	Active
1	PIP	I	Inputs P in P mode.	H
2	SWR – Y	O	Outputs the input signal selection pulse to the A/D converter.	H
3	SWB – Y			
4	SW Y			
5	SIZE3	I	Inputs sub-picture size select control signal.	H : 1/3 mode L : 1/4 mode
6	OUTC	O	Outputs sub-picture output switch control signal.	H : Displays sub-picture.
7	WAKU		Outputs frame signal.	H : Outputs frame signal.
8	MPLAY	I	Inputs sub-picture trick playback mode.	H : Trick playback mode
9	PVD		Inputs main-picture sync signal.	H/L
10	PHD			
11	STILL		Inputs sub-picture still mode signal.	H
12	RCC	O	Outputs reset signal for read clock.	L
13	RC	I	Inputs read clock (4.5 fcc).	H/L
14	YDACK	O	Outputs D/A converter clock for luminance signal.	H/L
15	YO6 (MSB)		Outputs digital luminance signal.	H/L
16	YO5			
17	YO4			
18	YO3			
19	YO2			
20	YO1 (LSB)			
21	MULTI	I	Inputs multi mode control.	H
22	CDACK	O	Outputs D/A converter clock for color-difference signal.	H/L
23	CO6 (MSB)		Outputs digital color signal.	H/L
24	CO5			
25	CO4			
26	CO3			
27	CO2			
28	CO1 (LSB)			
29	WED	I	Memory write control signal.	L : Activates A/D converter.
30	FSCO	O	Outputs the 1/4th division of 4 fsc.	H/L
31	ADJ	I	Sub-picture position adjustment.	H : Shifts 1 μsec to the left.
32	FFSC		Inputs clock for digital encoder (4 fsc).	H/L
33	DASW	O	Control terminal for the D/A converter.	H : Serves as P in P and D/A
34	Vcc	Vcc	Power supply terminal.	—
35	MI	I	DASW control signal.	L : Sets DASW to High forcibly
36	—	GND	Pin for tests.	
37	A7 (MSB)	O	Outputs memory address data.	H/L
38	A4			
39	A3			
40	A5			
41	A2			
42	A6			

Pin	Pin name	I/O	Function	Active
43	A1	O	Outputs memory address data.	H/L
44	RASN		Outputs memory row address specification.	When changing from HIGH to LOW
45	A0 (LSB)		Outputs memory address data.	H/L
46	WEN		Sub-picture information memory write control signal.	
47	GND	GND	Ground	
48	CASN	O	Outputs memory column address specification.	When changing from HIGH to LOW
49	D2		Outputs memory write data.	H/L
50	D3			
51	D1			
52	D4			
53	DTN		Outputs memory data transfer/read-out control.	H : Transfer mode L : Read-out mode
54	SO2	I	Outputs memory read-out signal to serial ports.	H/L
55	SO3			
56	SO1			
57	SO4			
58	—	Vcc	Pin for tests.	
59	SC1	O	Clock for memory serial read-out.	H/L
60	CSW	I	Inputs main-picture existence signal.	L : Not main-picture
61	AD6		Inputs 6-bit digital sub-picture data from the A/D converter.	H/L
62	AD5			
63	AD4			
64	AD3			
65	AD2			
66	AD1			
67	—	Vcc	Pin for tests.	
68	ADSW	I	Terminal for the A/D converter operation control.	L : Activates A/D converter
69	ADC	O	Outputs clock for the A/D converter.	H/L
70	CLIP		Sub-picture noise clip timing.	H : Clip frequency
71	MCP		Pulse for pedestal clamp.	H
72	WC	I	Write clock (4 fsc)	H/L
73	WCC	O	Reset signal for write clock.	L
74	RCA	I	Sub-picture position shifted/not shifted (vertically)	H : Shifted
75	CLEVEL	O	Output for color-difference signal feedback clamp.	
76	WCP		Color-difference signal clamp pulse.	H
77	BLP		Outputs blanking pulse.	H
78	SIFTC	I	Sub-picture position shift.	Rotates counter clockwise at each pulse input
79	CVD		Inputs sub-picture sync signal.	H : Sync. signal
80	CHD			

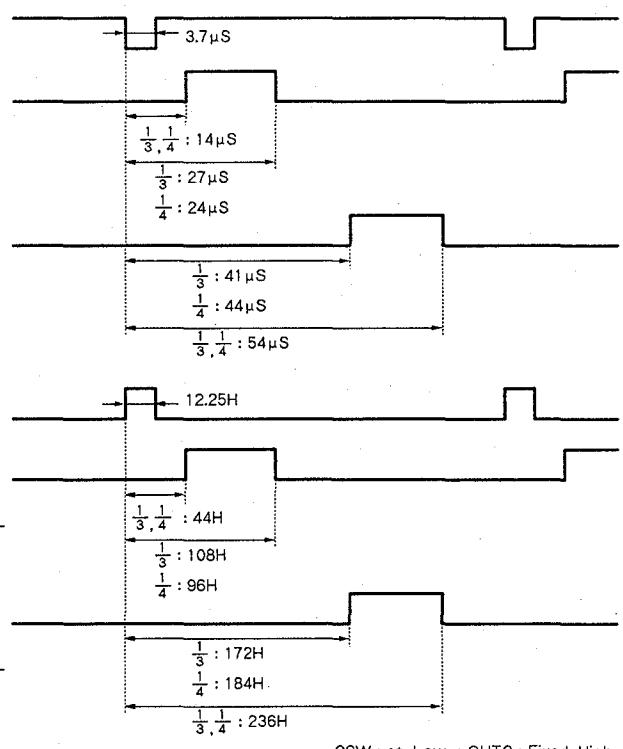
● Specification of output waveform

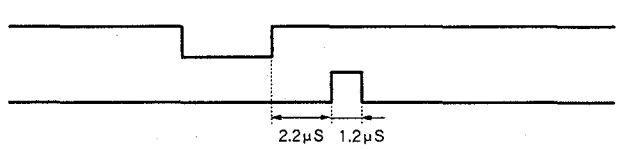
Note : • Numeric values described in the below specifications are only for reference, and not guaranteed.
• 1/3, 1/4 : Sub-picture size.

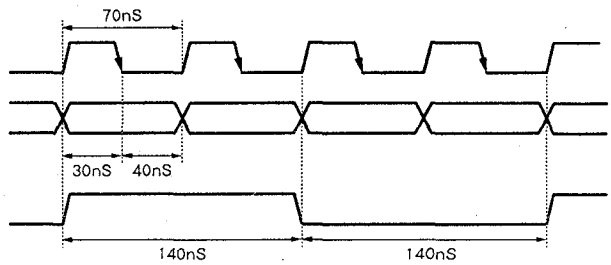
Classification	Pin name	Pin No.	Output waveform
Periphery of A/D converter, chroma IC and A/D switch IC	ADC	69	
	BLP	77	
	WCP	76	
	CLEVEL	75	
Periphery of the memory	RASN	44	
	CASN	48	
	A0 – A7	45 43 – 37	
	D1 – D4	49 – 52	
	WEN	46	

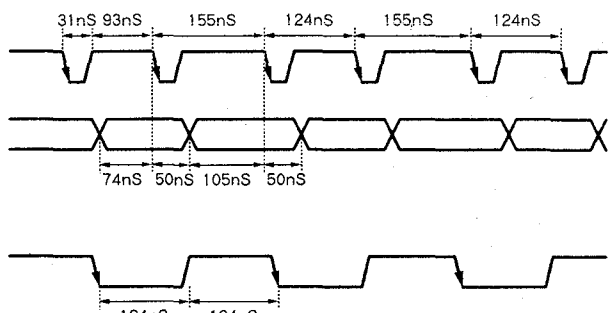
Classification	Pin name	Pin No.	Output waveform
Periphery of the memory	DTN	53	WCC DTN (Sub-picture on the right side of main-picture) DTN (Sub-picture on the left side of main-picture) 
	SC1	59	PHD RCC SC (Sub-picture on the left side of main-picture) SC (Sub-picture on the right side of main-picture) 
Periphery of the PINP switch	WAKU	7	RCC WAKU (Sub-picture on the left side of main-picture) WAKU (Sub-picture on the right side of main-picture) PVD WAKU (Sub-picture on the upper side of main-picture) WAKU (Sub-picture on the lower side of main-picture) 

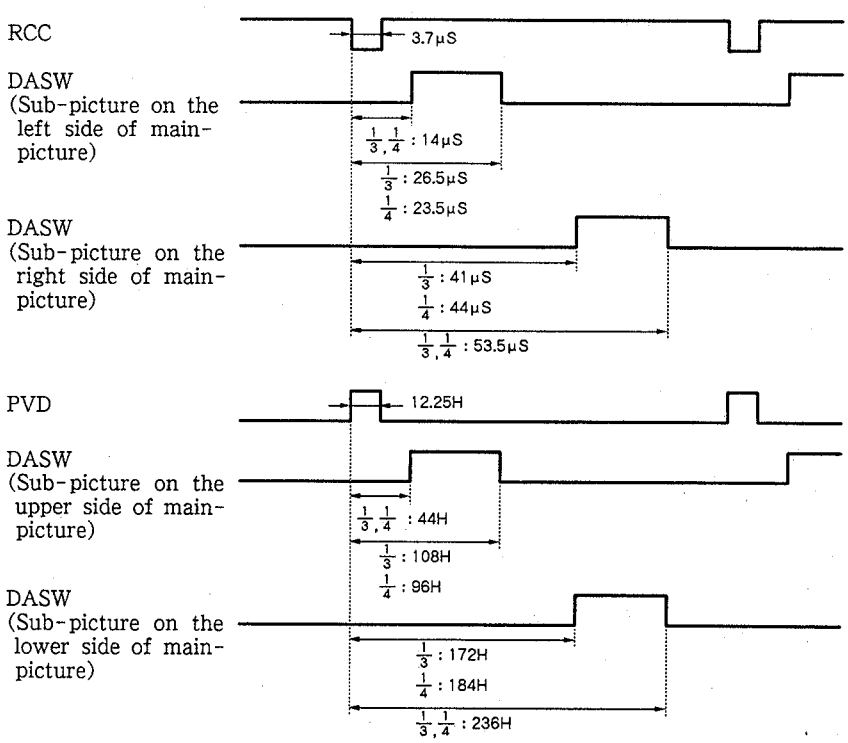
Classification	Pin name	Pin No.	Output waveform
Periphery of the PINP switch	CLIP OUTC	70 6	RCC CLIP OUTC (Sub-picture on the left side of main-picture) CLIP OUTC (Sub-picture on the right side of main-picture) PVD CLIP OUTC (Sub-picture on the upper side of main-picture) CLIP OUTC (Sub-picture on the lower side of main-picture) CSW : at Low→OUTC : Fixed High
	MCP	71	RCC MCP
Periphery of the D/A converter	CDACK	22	CDACK
	CO1 – CO6	28 – 23	CO1 – CO6
	FSCO	30	FSCO
	YDACK	14	YDACK (For the sub-picture)
	YO1 – YO6	20 – 15	YO1 – YO6
			YDACK (For the sub-picture)









Classification	Pin name	Pin No.	Output waveform
Periphery of the D/A converter	DASW	33	

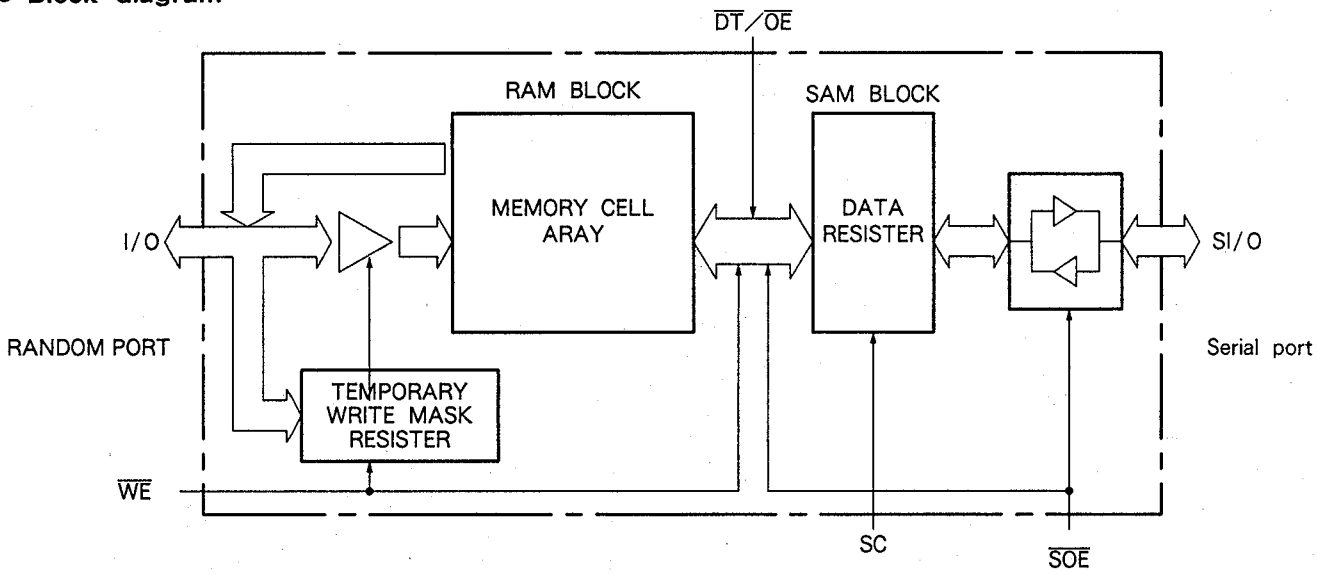
DASW : at Hi→Y - D/A converter, C - D/A converter : Using
DASW : at Lo→C - D/A converter is used and Y - D/A converter is not used.

■ HM53461P – 12

Video RAM

The HM53461P-12 is divided into the two sections; the RAM for drawing and the RAM for display. The read/write operation can be effectuated for each section independently using the different ports. This allows that the drawing and display data read-out are effectuated simultaneously, and an effective drawing is made possible.

● Block diagram



Six control signals, $\overline{RAS}$, $\overline{CAS}$, $\overline{DT/OE}$, $\overline{WE}$, $\overline{SOE}$, $\overline{SC}$, are available with the HM53461P-12. The status of $\overline{CAS}$, $\overline{DT/OE}$, $\overline{WE}$ and $\overline{SOE}$ at the trailing edge of $\overline{RAS}$ determines the operation mode as shown in the below Table.

● Operation mode table

Signal level at the leading edge of $\overline{RAS}$				RAM mode	SAM mode	
$\overline{CAS}$	$\overline{DT/OE}$	$\overline{WE}$	$\overline{SOE}$		Direction of SI/O	Remarks
H	H	H	X	Read/Write	Sin/Sout	Notes 1, 2, 3
H	H	L	X	Temporary mask write	Sin/Sout	Notes 1, 2, 3
H	L	H	X	Read transfer	Sout	Note 2
H	L	L	L	Write transfer	Sin	
H	L	L	H	Pseudo transfer	Sin	
L	X	X	X	CBR refresh	Sin/Sout	Notes 1,2

H : high
L : low
X : do'nt care

Note
1. The direction of SI/O is determined in accordance with the transfer cycle executed immediately before.
2. Even when the direction of SI/O is set to Sout, SI/O will be set to high impedance if $\overline{SOE}$ is at the high level.
3. The write operation will be effectuated if $\overline{WE}$ becomes low at the trailing edge of $\overline{CAS}$ or from the time between the trailing edge of $\overline{CAS}$ to the leading edge of $\overline{RAS}$.

■ PDG040

Microcomputer

● Pin Function

I/O I : CMOS input IS : COMS schmitt trigger input. O : CMOS output
N : N-ch open dolein output A/D : A/D converter input

NO.	Pin name	I/O	Function	Active
1	$\overline{\text{REM}}$	IS	Remote control signal input. Deciding by the level and edge.	LO
2	AIR0 (ST)	I	Broadcast format deciding input	LO
3	AIR1 ($\overline{\text{SAP}}$)	I		LO
4	VMUTE	I/O	Video muting signal output and blanking detection input. Normally functions as an input port to detect no signal condition (HI) for auto power off. When generating the test cross signal, switching input or turning power ON/OFF, VMUTE (HI) is output.	HI
5	AMUTE	O	Audio muting signal output. When selecting MUTE mode, switching input and turning power ON/OFF, AMUTE (HI) is output.	HI
6	$\overline{\text{DNREQ}}$	I	AFT down requiring signal input. When a desired station is placed lower than the received frequency, the tuner requires to lower the received frequency.	LO
7	$\overline{\text{UPREQ}}$	I	AFT up requireing signal input. When a desired station is placed higher than the received frequency, the tuner requires to raise the received frequency.	LO
8	NC	—	Connected to HI.	HI
9	ACCLK	I	AC pulse detection input. Time control pulse for sleep timer, auto power off. Automatic deciding the frequency of 50Hz/60Hz. To detect the AC power off, dummy reset (software reset) is done when three waves are lacked.	HI
10	TV VMUTE	O	Video muting signal output for TV. When detuning, turning power ON/OFF or switching an antenna, TV VMUTE is output. When tuning, it is released when AFT is in 62.5kHz step.	HI
11	TV AMUTE	O	Audio muting signal output for TV. When detuning, turing power ON/OFF or switching an antenna, TV AMUTE is output. When tuning, it is released if AFT is completely tuned.	HI
12	MTS2 (MAIN)	O	MTS mode output.	LO
13	MTS1 (SAP)	O		LO
14	DA0	O	D/A converter switching output. This selects the output of analog multiplexer IC201 and IC202 (TC4051BP).	HI
15	DA1			
16	DA2			
17	DA3			

	STEREO/SAP	SAP	STEREO	MONO
AIR0	L	H	L	H
AIR1	L	L	H	H

	MAIN/SAP	SAP	MAIN	MONO
MTS2	L	L	H	H
MTS1	L	H	L	H

	DA3	DA2	DA1	DA0
COLOR	L	L	L	H
TINT	L	L	H	L
CONTRAST	L	L	H	H
BRIGHTNESS	L	H	L	L
SHAPNESS	L	H	L	H
BASS	L	H	H	L
TREBLE	L	H	H	H
VOLUME	H	L	L	L
BALANCE	H	L	L	H
SURROUND VOL	H	L	H	L
(NOT USED)	H	L	H	H
CONVERGENCE R – H	H	H	L	L
CONVERGENCE R – V	H	H	L	H
CONVERGENCE B – H	H	H	H	L
CONVERGENCE B – V	H	H	H	H

<table>
<tr><th>NO.</th><th>Pin name</th><th>I/O</th><th>Function</th><th>Active</th></tr>
<tr><td>18</td><td>OSDSTB</td><td>O</td><td>OSD IC204 (UPD6145C-001) data writing strobe pulse output. After data transmission, a positive pulse of minimum 1.9μsec is output.</td><td>HI</td></tr>
<tr><td>19</td><td>$\overline{OSD}$</td><td>O</td><td>OSD IC204 (UPD6145C-001) chip enable output.</td><td>LO</td></tr>
<tr><td>20</td><td>$\overline{EAROM}$</td><td>O</td><td>EAROM IC205 (M6M8011P) chip enable output.</td><td>LO</td></tr>
<tr><td>21</td><td>OPTION</td><td>O</td><td>Function switching diodes (D216 to D219) reading pulse output. Just after reset, LO pulse is output only once.</td><td>LO</td></tr>
<tr><td>22</td><td>KI0</td><td rowspan="4">I</td><td rowspan="4">Main unit key on reading input port (key scanning input)
Normally HI.</td><td rowspan="4">LO</td></tr>
<tr><td>23</td><td>KI1</td></tr>
<tr><td>24</td><td>KI2</td></tr>
<tr><td>25</td><td>KI3</td></tr>
<tr><td>26</td><td>KO0</td><td rowspan="4">N</td><td rowspan="4">Main unit key on reading pulse output (key scanning output)
Normally LO. When a key is pressed, scanning starts, and ports which are not active are set to HI.</td><td rowspan="4">LO</td></tr>
<tr><td>27</td><td>KO1</td></tr>
<tr><td>28</td><td>KO2</td></tr>
<tr><td>29</td><td>KO3</td></tr>
<tr><td>30</td><td>$\overline{RELAY}$ (OD)</td><td>N</td><td>Power relay (RY651) control. LO : Relay ON, HI : Relay OFF</td><td>LO</td></tr>
<tr><td>31</td><td>NC</td><td>I</td><td>Connected to GND. Used when developing a program.</td><td>LO</td></tr>
<tr><td>32</td><td>VSS</td><td>I</td><td>GND</td><td>LO</td></tr>
<tr><td>33</td><td>INP0</td><td rowspan="3">N</td><td rowspan="3">Input signal switching output.
<table>
<tr><th>FUNCTION</th><th>INP0</th><th>INP1</th><th>INP2</th></tr>
<tr><td>TV</td><td>H</td><td>H</td><td>L</td></tr>
<tr><td>VDP</td><td>H</td><td>L</td><td>L</td></tr>
<tr><td>VIDEO 1</td><td>L</td><td>H</td><td>L</td></tr>
<tr><td>VIDEO 2</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td>VIDEO 3</td><td>H</td><td>H</td><td>H</td></tr>
</table></td><td rowspan="3"></td></tr>
<tr><td>34</td><td>INP1</td></tr>
<tr><td>35</td><td>INP2</td></tr>
<tr><td>36</td><td>XTAL OUT</td><td>O</td><td rowspan="2">Connect a microcomputer clock oscillator. (A ceramic oscillator of 4.2MHz is connected.)</td><td rowspan="2"></td></tr>
<tr><td>37</td><td>EXTAL IN</td><td>I</td></tr>
<tr><td>38</td><td>$\overline{RESET}$</td><td>IS/O</td><td>System reset.
When the power is turned on, LO is output, and the peripheral circuits are reset. In the other cases, this functions as an input port for RESET pulse.</td><td>LO</td></tr>
<tr><td>39</td><td>$\overline{SCK}$</td><td>O</td><td>Serial transmission clock output. Used for interface with an OSD IC204 UPD6145C-001 and an EAROM IC205 (M6M80011P).</td><td></td></tr>
<tr><td>40</td><td>SO</td><td>O</td><td>Serial data output. Used for interface with an OSD IC204 UPD6145C-001 and an EAROM IC205 (M6M80011P).</td><td></td></tr>
<tr><td>41</td><td>BUSY</td><td>I</td><td>Writing BUSY input from a non-volatile memory EAROM IC205 (M6M80011P). Until HI is output from the EAROM IC205 (M6M80011P), the system is in standby mode for writing.</td><td>LO</td></tr>
<tr><td>42</td><td>SI</td><td>IS</td><td>Serial data input. Used for interface with an EAROM IC205 (M6M80011P).</td><td></td></tr>
<tr><td>43</td><td>ANT</td><td>O</td><td>Antenna switching signal output.
<table>
<tr><td>ANTENNA – 1</td><td>L</td></tr>
<tr><td>ANTENNA – 2</td><td>H</td></tr>
</table></td><td></td></tr>
<tr><td>44</td><td>$\overline{PWM}$</td><td>O</td><td>PWM output. Pulse train output of a D/A converter before analog voltage conversion.</td><td></td></tr>
<tr><td>45</td><td>$\overline{LOCK}$</td><td>IS</td><td>PLL lock detection input. When the PLL IC303 (TD6359P) is locked with the data sent from the microcomputer, LO is input.</td><td>LO</td></tr>
<tr><td>46</td><td>HS</td><td>IS</td><td>Horizontal sync count input for the tuner AFT. H-SYNC is counted with the cycle of 7.8msec, and when the counted amount is from 108 to 139, the system decides that a station exists.</td><td></td></tr>
</table>

<table>
<tr><th>NO.</th><th>Pin name</th><th>I/O</th><th>Function</th><th>Active</th></tr>
<tr><td>47</td><td>CROSS</td><td>O</td><td>Indicates the test cross signal generation. To prevent burning CRTs when it is set to test cross screen, the output level of the OSD IC204 (UPD6145C) is lowered by controlling the Q237 through Q239.</td><td>HI</td></tr>
<tr><td>48</td><td>PLL CLK</td><td>O</td><td>Clock output for transmitting PLL data. Clock output for transmitting serial data to the PLL IC303 (TD6359P).</td><td></td></tr>
<tr><td>49</td><td>PLL DT</td><td>O</td><td>PLL data output. Serial data is output to the PLL IC303 (TD6359P).</td><td></td></tr>
<tr><td>50</td><td>PLL EN</td><td>O</td><td>PLL data enable output. Chip enable output to transmit the serial data to the PLL IC303 (TD6359P).</td><td>HI</td></tr>
<tr><td>51</td><td>P</td><td>O</td><td>Pulse output for watch dog timer. While TBT interruption and PDM interruption in a program function normally, a pulse of 1msec is output with the cycle of 7.8msec.</td><td></td></tr>
<tr><td>52</td><td>PIP</td><td>O</td><td>P in P function ON.</td><td>HI</td></tr>
<tr><td>53</td><td>PINP0</td><td rowspan="3">O</td><td rowspan="3">Input for P in P.
Switching signal output.
<table><tr><th>FUNCTION</th><th>PINP0</th><th>PINP1</th><th>PINP2</th></tr><tr><td>TV</td><td>H</td><td>H</td><td>L</td></tr><tr><td>VDP</td><td>H</td><td>L</td><td>L</td></tr><tr><td>VIDEO 1</td><td>L</td><td>H</td><td>L</td></tr><tr><td>VIDEO 2</td><td>L</td><td>L</td><td>L</td></tr><tr><td>VIDEO 3</td><td>H</td><td>H</td><td>H</td></tr></table></td><td rowspan="3"></td></tr>
<tr><td>54</td><td>PINP1</td></tr>
<tr><td>55</td><td>PINP2</td></tr>
<tr><td>56</td><td>NC</td><td>N</td><td></td><td></td></tr>
<tr><td>57</td><td>SIZE (DPS)</td><td>N</td><td>For the model with P in P function, size switching output. For the model with surround function, dynamic phase surround.</td><td>HI</td></tr>
<tr><td>58</td><td>POST
(DOLBY)</td><td>N</td><td>For the model with P in P function, position switching pulse output. For the model with surround function, DOLBY SURROUND MODE.</td><td>HI</td></tr>
<tr><td>59</td><td>PMUTE</td><td>N</td><td>When P in P is set to ON and the input of P in P is TV, this is released (LO).
<table><tr><th></th><th>PINP INPUT = TV</th><th>OTHER</th></tr><tr><td>PINP : ON</td><td>LO</td><td>HI</td></tr><tr><td>PINP : OFF</td><td>HI</td><td>HI</td></tr></table></td><td>HI</td></tr>
<tr><td>60</td><td>NC</td><td>I</td><td></td><td></td></tr>
<tr><td>61</td><td>NC</td><td>I</td><td></td><td></td></tr>
<tr><td>62</td><td>PLL TEST</td><td>I</td><td>AFT operation stops. Used for testing the tuner.</td><td>LO</td></tr>
<tr><td>63</td><td>DPO</td><td>A/D</td><td>Analog voltage input for DPO control.</td><td>—</td></tr>
<tr><td>64</td><td>VCC</td><td>—</td><td>+5V Power supply voltage input.</td><td>—</td></tr>
</table>

14. CIRCUIT DESCRIPTION

14.1 STABILIZATION CIRCUIT OF AN ANODE VOLTAGE

A conventional stabilization circuit of an anode voltage is shown in Fig. 14-1.

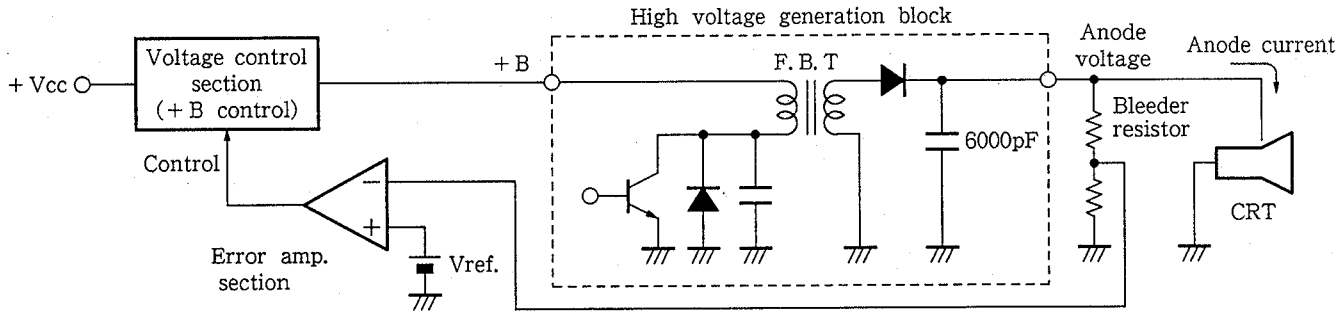


Fig. 14-1

In the conventional system, the anode voltage is directly divided by a bleeder resistor, and is fed back. By detecting the change of the feedback voltage, a voltage control section is controlled, and the anode voltage is stabilized. The SD-P503P-QD controls the anode voltage by detecting the change of the anode current. Fig. 14-2 shows the stabilization circuit.

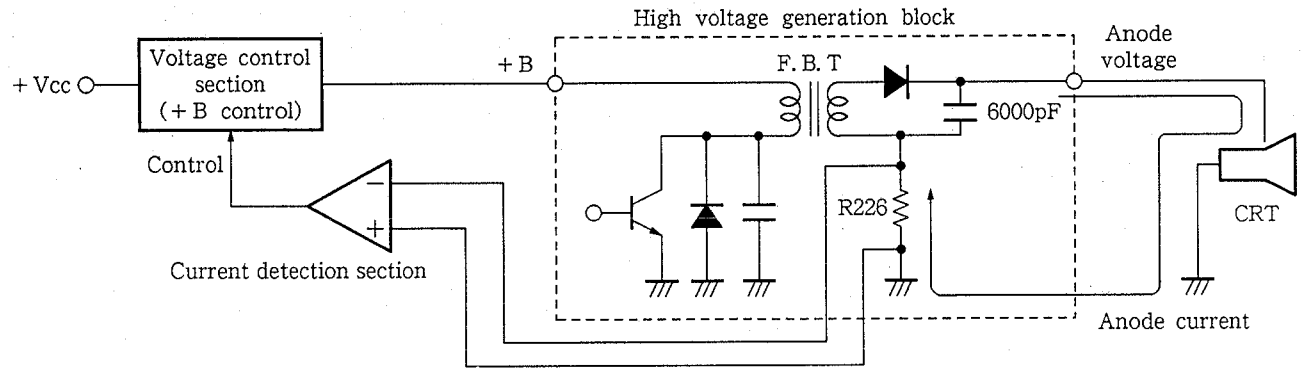


Fig. 14-2

This circuit detects the change of the anode current which causes the change of the anode voltage. Because the change of the anode voltage and that of the anode current are in inverse proportion to each other, the anode voltage can be controlled by detecting the change of this anode current. The anode current which returns to the flyback transformer (FBT) through the R226 resistor is detected by the current detection section. The voltage control section is controlled according to the change of the detected anode current which stabilizes the anode voltage.

14.2 CONTROLLING A PICTURE, SOUND QUALITY AND VOLUME BY THE IC203 (PDG040)

1. Operation

A bolck diagram of the D/A converter which controls a picture, sound quality and volume is shown in Fig. 14-3.

The IC203 (PDG040) microcomputer outputs the control data for 15 circuits by time sharing from the built-in 8-bit PWM output (44-pin). This control data is input to a PWM/DC conversion circuit, and converted to the DC voltage from the PWM pulse row. The converted DC voltage is a result of the time division multiplex of 15 kinds of data so that the desired data is selected by an analog multiplexer (IC201, IC202), and output to each buffer.

The IC203 (PDG040) cannot control switching timing of the PWM output by software so that it is converted to the stable DC voltage by the PWM/DC conversion circuit, and connected to the output side. 14 circuits are actually controlled so that one of the control data for 15 circuits is not used for controlling, but is used for selecting the X3 of the IC201.

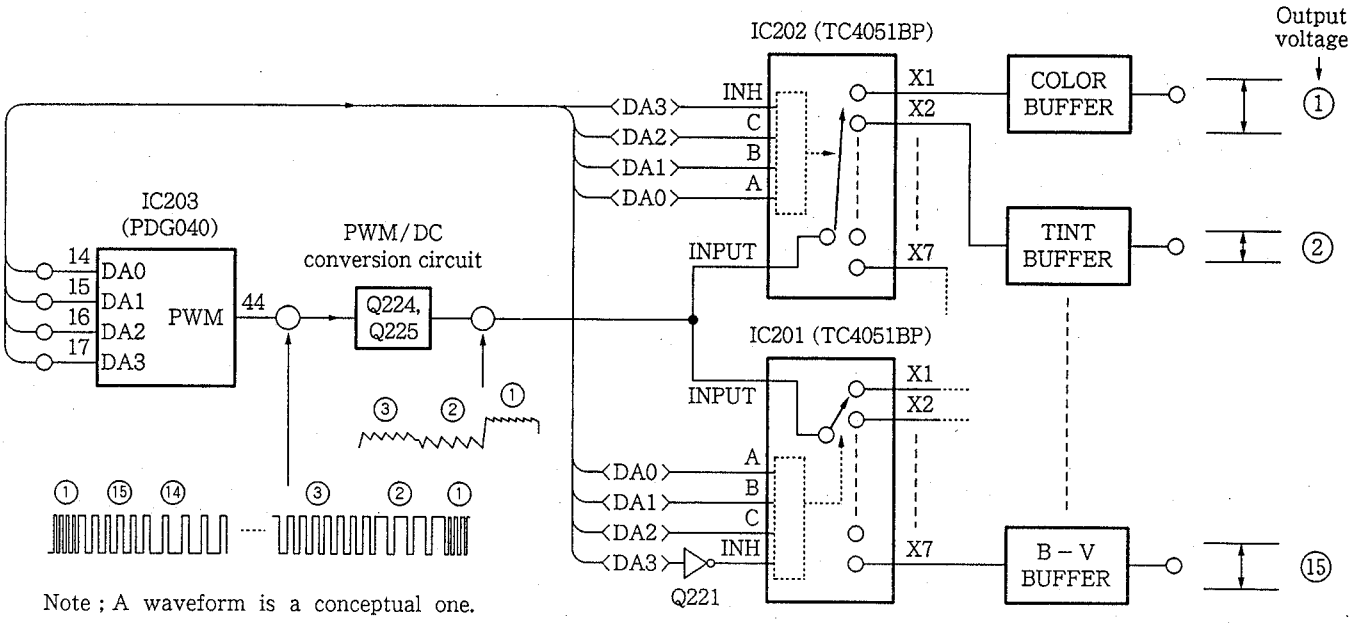


Fig. 14-3 Block diagram of D/A converter section for picture, sound quality and volume control

2. PWM output

The PWM output of the PDG040 is as shown in Fig. 14-4.

One conversion cycle of the PWM is 122μsec, and the duty will be changed in 256 steps according to the content of the output data. When the data is output for 64 cycles (7.8msec), the content of the output data is rewritten. This means that the same data is output for 64 cycles.

This controls 14 circuits actualy, however the data for 15 circuits is output for reasons of the program. (The data for one circuit has no meaning as a result.)

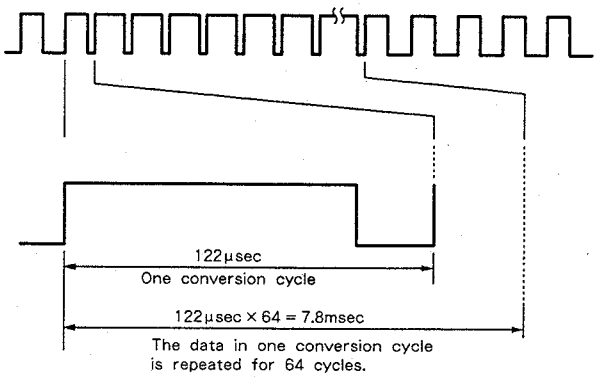


Fig. 14-4

3. PWM/DC conversion circuit

The output pulse train of the PWM is converted to DC in this circuit. The content of the data is changed for every 7.8msec. So the time constant is set wide enough not to output the pulse component of the PWM and also small enough to make the signal stable in 7.8msec period.
The data in the last 1msec of 7.8msec period is actually used as data. The DC voltage in this period is output to the circuit which controls by a analog multiplexer.

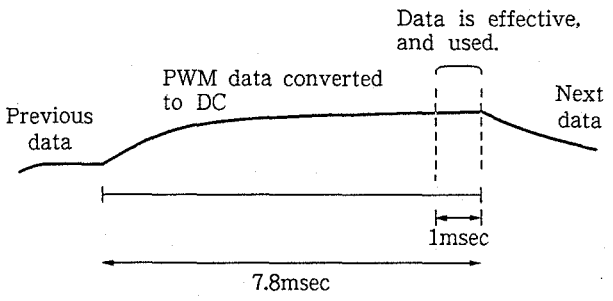


Fig. 14-5

4. Analog multiplexer

The two devices of CMOS ICs, IC201 and IC202 (TC4051BP), distribute the data converted to DC by the PWM/DC conversion circuit to each circuit. Until the output of the PWM/DC conversion circuit becomes stable, the output being converted is not connected for 6.8msec in 7.8msec period by selecting the X_0 of the IC202. The X_0 terminal is high impedance so that no load is added to the conversion circuit. The port designated by the PDG040 is selected only for the last 1msec in 7.8msec period, and the data is output to the buffer.

(Open)	X_0 (Pin 13) of IC202
COLOR	X_1 (Pin 14) of IC202
TINT	X_2 (Pin 15) of IC202
CONTRAST	X_3 (Pin 12) of IC202
BRIGHTNESS	X_4 (Pin 1) of IC202
SHARPNESS	X_5 (Pin 5) of IC202
BASS	X_6 (Pin 2) of IC202
TREBLE	X_7 (Pin 4) of IC202
VOLUME	X_0 (Pin 13) of IC201
BALANCE	X_1 (Pin 14) of IC201
SURROUND VOL	X_2 (Pin 15) of IC201
Do not use	X_3 (Pin 12) of IC201
CONVERGENCE R – H	X_4 (Pin 1) of IC201
CONVERGENCE R – V	X_5 (Pin 5) of IC201
CONVERGENCE B – H	X_6 (Pin 2) of IC201
CONVERGENCE B – V	X_7 (Pin 4) of IC201

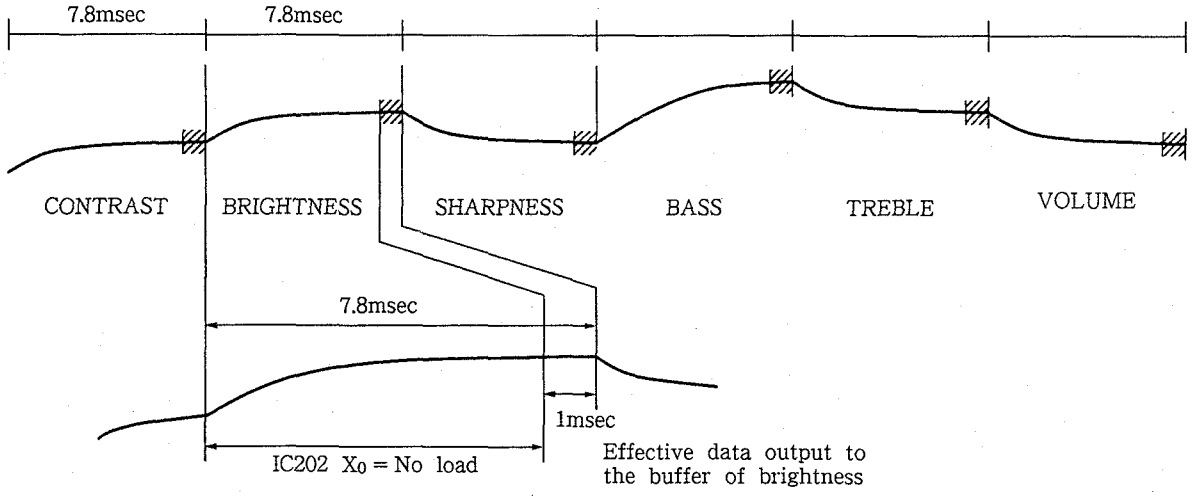
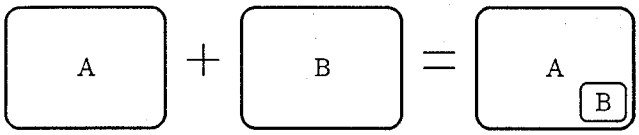


Fig. 14-6

14.3 PICTURE-IN-PICTURE (P IN P) FUNCTION

The PinP function displays two different pictures simultaneously on a screen, one is a main picture and the other is a sub picture. The sub picture is displayed on the main picture. (See Fig. 14-7.)



Main picture　　Sub picture　　PinP (Main and Sub)

Fig. 14-7 Screen of PinP

A video signal of a sub picture is input to an A/D converter, and converted to the digital signal, and memorize. The memorized data of the sub picture is read synchronizing with the main picture signal at the designated sweeping position of the main picture. The read sub picture has been compressed to 1/3 or 1/4. The main and sub pictures are switched by time sharing and mixed. (See Fig. 14-8.) The system of the PinP function and the principle for generating a sub picture are described below.

Fig. 14-9 shows the outline of the system. The system is composed of main 9 ICs (IC501 through IC508 and IC510) in the PinP assembly and peripheral ICs. Functions of these ICs are shown in Table. 14-1.

Main picture signal

The input signal of a main picture passes the buffer amplifier in IC510 (HA118088NT), and a part of the signal is output from pin 22 and input to the IC502 (HA11525NT).

In the IC502, vertical and horizontal sync signals are extracted to synchronize the sub picture with the main picture. To match the phases of the chrominance signal of the sub picture and that of the main picture, the IC502 detects the color burst signal of the main picture and generates the chrominance subcarrier synchronized with the detected signal. The remained main picture signal is input to the mixing SW in the IC510 for mixing with the compressed sub picture.

Sub picture signal

The sub picture signal is divided into three, a luminance signal Y and color difference signals B-Y and R-Y for easy sampling. The Y signal is isolated by a LPF (Low Pass Filter), and the chrominance signal is by a BPF (Band Pass Filter), and demodulated to B-Y and R-Y signals by the IC503 (HA11532NT). Then vertical and horizontal signals are also isolated used for a timing signal. These sync signals are input to the timing signal generation circuit in the IC501 (HD49728) PinP controller passing through the IC513 (TC74HC74AP). The IC513 is FF (Flip Flop) and makes the vertical and horizontal sync signals slightly delay for controlling the signal process timing.

The isolated Y, B-Y and R-Y signals of the sub picture are sampled alternately by the IC507 (HA19216) A/D converter controlled by a timing signal sent from the IC501 and the IC506 (HA11544) which switches the inputs. When sampling, the first field (odd field) and the second field (even field) are distinguished. Fields are distinguished by the vertical and horizontal sync signals isolated from the sub picture signal.

The data for the sub picture signal in a verital direction is memorized for every three scanning lines. The signals are thinned out. The Y, B-Y and R-Y signals are sampled by line sequential system from different scaning lines.

The IC507 A/D converter converts the sampled Y, B-Y and R-Y signals to 6-bit digital data. The converted digital data is changed from 6-bit data to 4-bit data in the IC501, and output to the IC508 (HM53461P-12) memory. This change is necessary because the memory is the 4 bits/1 byte configuration. The IC508 memory is prepared for this system, and has a RAM (Random Access Memory) of dynamic operation type and a SAM (Serial Access Memory). The RAM and SAM have the independant control terminals for read and write, and input and output ports. The RAM is used for writing, and the SAM is used for reading. This system allows the simultaneous data write and read, and the write with high efficiency will by possible. The data should be read from the memory at high speed equivalent to three times the writing speed so that the sub picture is compressed and mixed with the main picture.

To assure high-speed reading, the SAM inputs and outputs the data from the less significant address by serial access processing so that the reading at higher speed than writing to the RAM will be possible. While the data is being written in the RAM of the IC508, the stored data is being read from the SAM, and divided into the luminance signal Y and color difference signals B-Y and R-Y in IC501. Then the 4-bit data is changed to the original 6-bit data.
The Y signal of 6-bit data is input to the IC505 (HA19508A) D/A converter, and converted to an analog signal from a digital signal.
The B-Y and R-Y signals are encoded in the IC501, and output as a chrominance signal. Then it is input to the IC504 (HA19507NT) D/A converter, and converted to an analog signal. The signal is converted using a subcarrier whose phase matches that of the color burst signal of the main picture. This subcarrier is generated in the IC502 (HA11525NT), and input to the IC504. So the signal converted to analog is a color signal having a color subcarrier. The phases are aligned by the VR501 attached to the IC502.
The analog Y and C (chrominance) signals pass the LPF and BPF, and input to the IC502. The burst level of the C signal is adjusted to the chroma level of the main picture by the VR502 at the input of the IC502. The Y and C signals input to the IC502 are mixed, and reproduced as a video signal for the sub picture. The reproduced sub picture signal has been compressed to 1/3 or 1/4 (switchable) of the effective screen area of the main picture vertically and horizontally when the data is read.

Mixing the main and sub pictures

The sub picture signal reproduced in the IC502 is input to the IC510, and mixed with the main picture. The pictures are mixed by a mixing SW in the IC510 (HA118088NT). The mixing SW is controlled by the control signal from the IC501 (HD49728) PinP controller to insert the sub picture at a designated position on the main picture by switching signals. By controlling timing for switching, the position to insert the sub picture can be changed. The sub picture is switched using the sync signal of the main picture extracted in the IC502 as mentioned before. The size and position of the sub picture can be controlled by the μ-COM IC203 (PDG040) on the VIDEO/AUDIO assembly. After the above processing, the mixed main and sub picture signal is sent to the next stage, video processing circuit as a video signal.

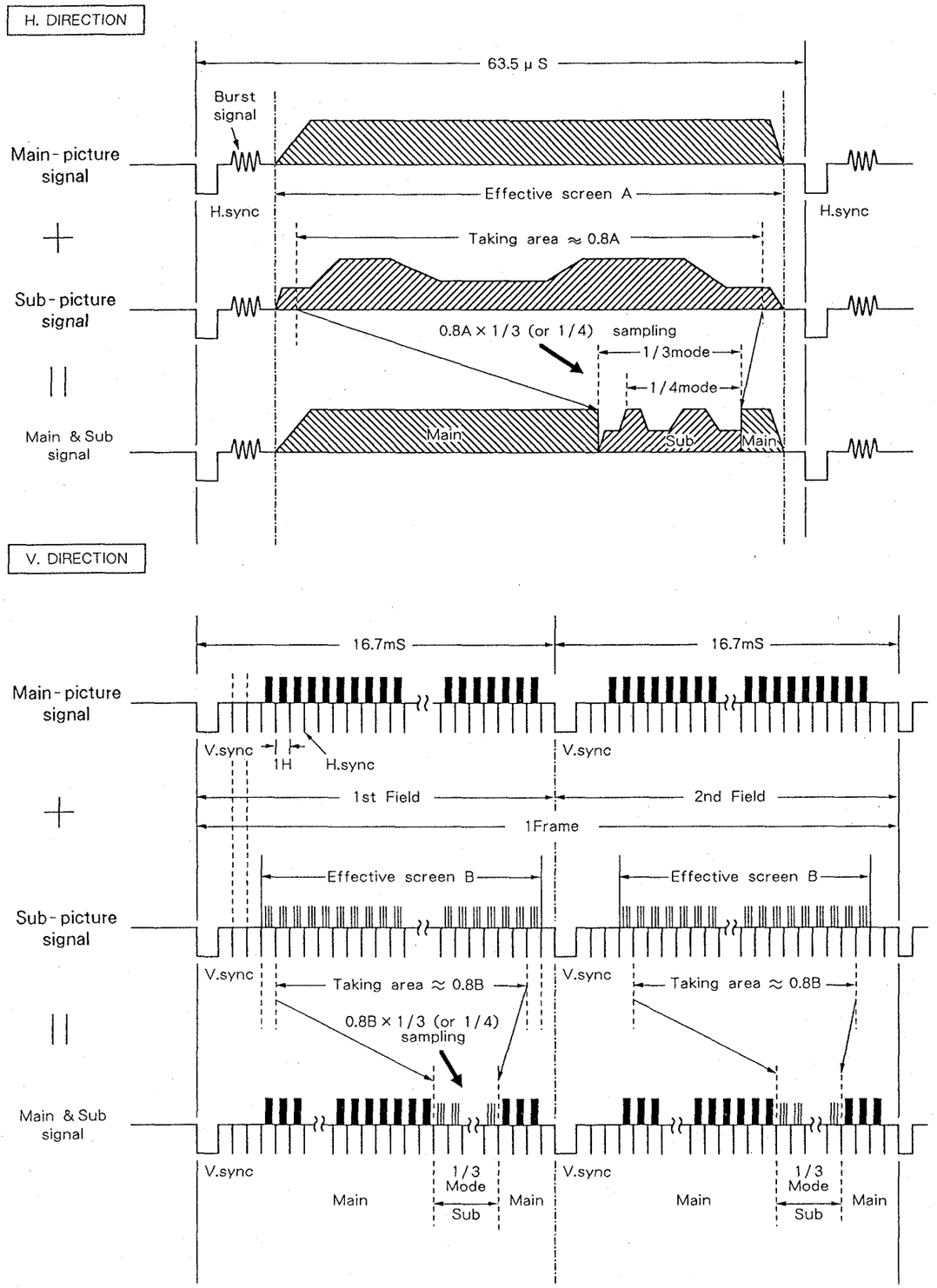


Fig.14 – 8 Outline of PinP composite signal

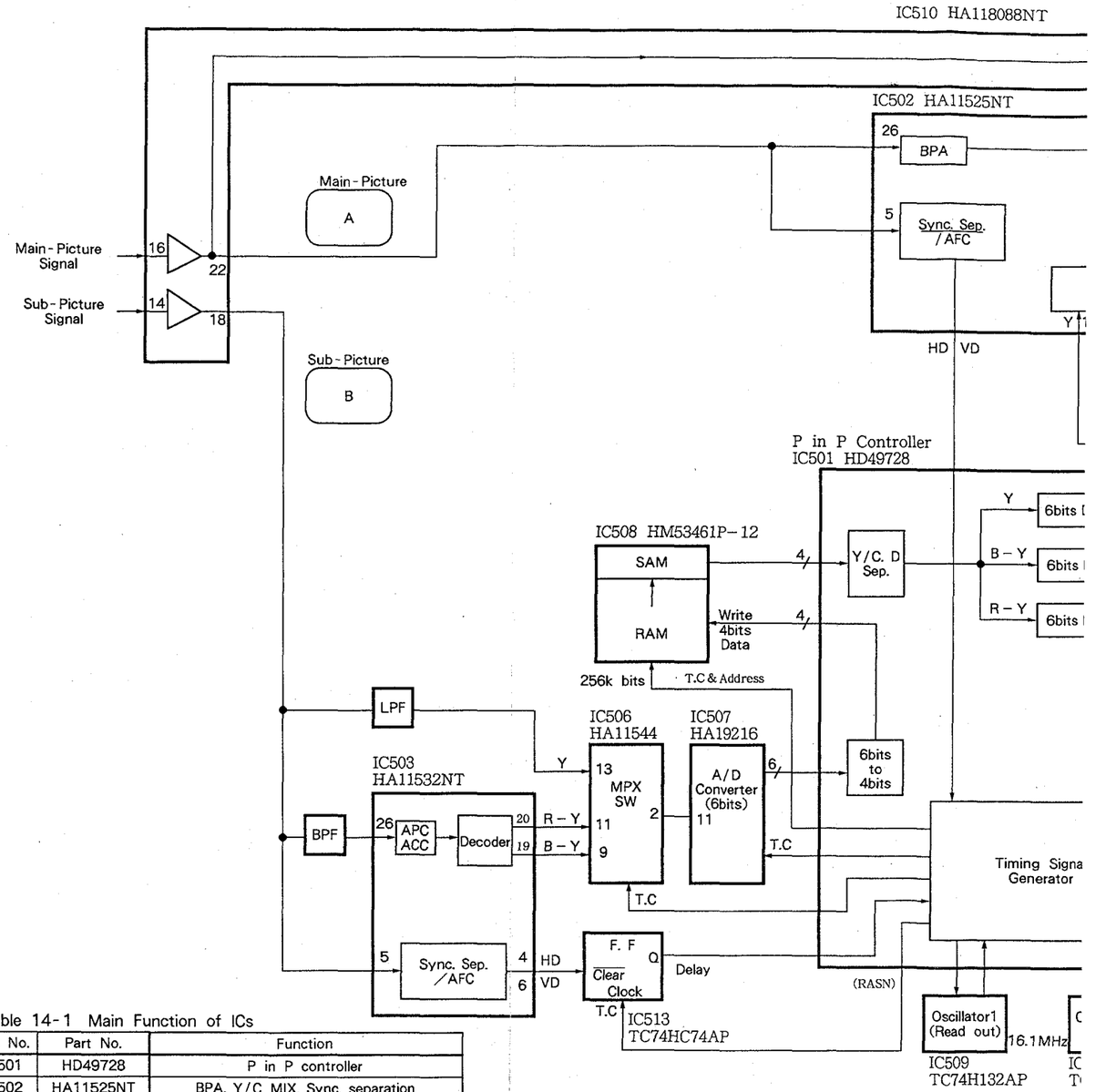
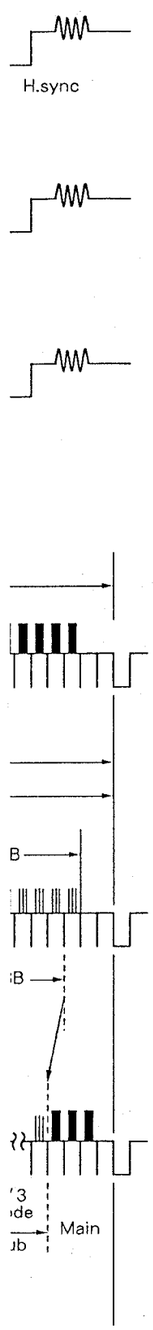
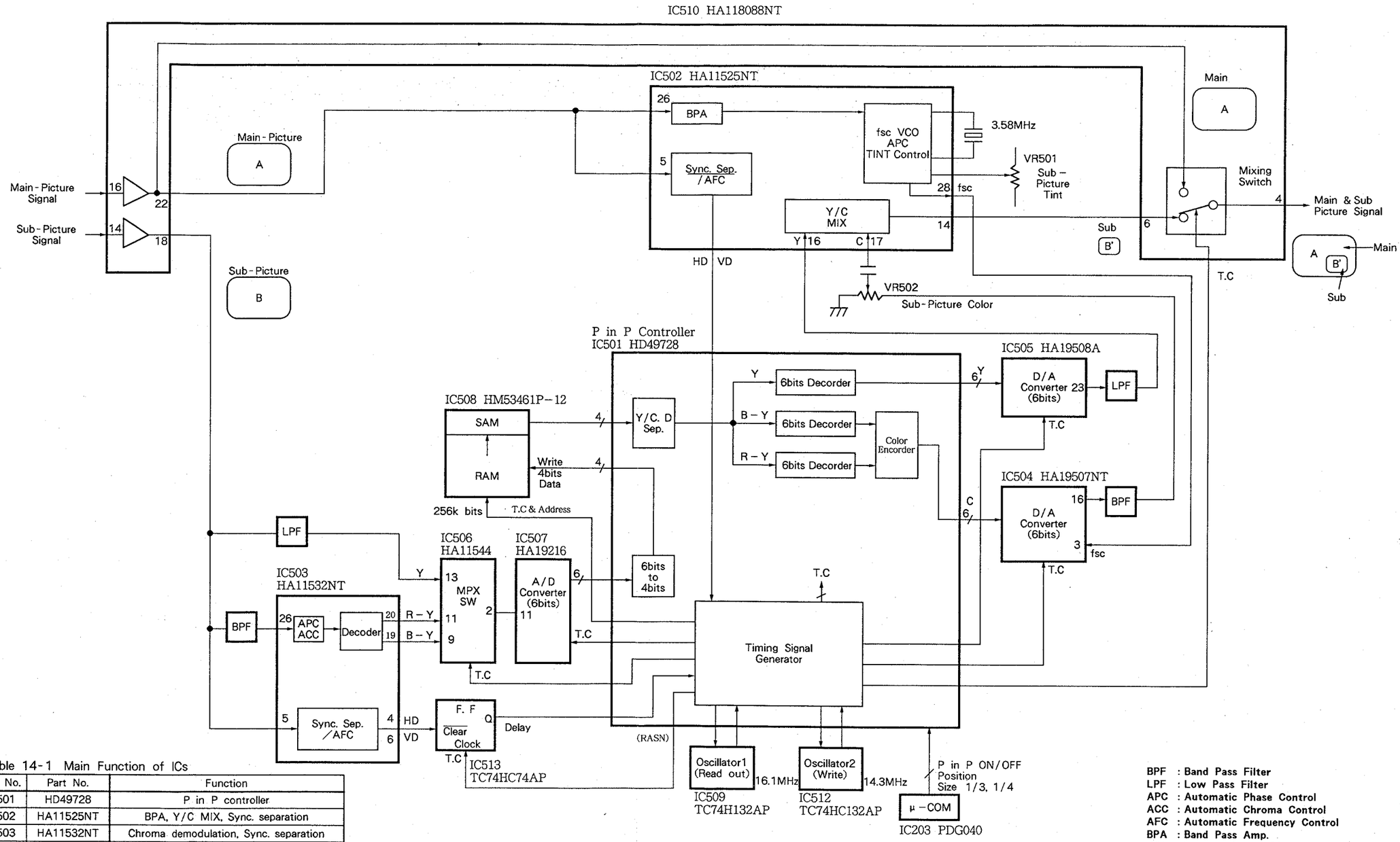


Table 14-1 Main Function of ICs

IC No.	Part No.	Function
501	HD49728	P in P controller
502	HA11525NT	BPA, Y/C MIX, Sync. separation
503	HA11532NT	Chroma demodulation, Sync. separation
504	HA19507NT	6bits High speed D/A converter
505	HA19508A	6bits High speed D/A converter
506	HA11544	MPX SW for A/D converter
507	HA19216	6bits High speed A/D converter
508	HM53461P – 12	256k bits Multi – port RAM
509	TC74H132AP	Oscillator
510	HA118088NT	Switch for P in P
512	TC74HC132AP	Oscillator

Fig. 14-9 P in P System Block Di





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503	HA11532NT	Chroma demodulation, Sync. separation
504	HA19507NT	6bits High speed D/A converter
505	HA19508A	6bits High speed D/A converter
506	HA11544	MPX SW for A/D converter
507	HA19216	6bits High speed A/D converter
508	HM53461P-12	256k bits Multi-port RAM
509	TC74H132AP	Oscillator
510	HA118088NT	Switch for P in P
512	TC74HC132AP	Oscillator

Fig. 14-9 P in P System Block Diagram

BPF : Band Pass Filter
LPF : Low Pass Filter
APC : Automatic Phase Control
ACC : Automatic Chroma Control
AFC : Automatic Frequency Control
BPA : Band Pass Amp.
RAM : Random Access Memory
SAM : Serial Access Memory
T.C : Timing Control Signal
C.D : Color Difference Signal
fsc : Chrominance subcarrier frequency
HD : Horizontal Driving signal
VD : Vertical Driving signal

Main points are described below for reference.

● **Sub picture displaying area**

About 80 % of an effective screen area (the area where the picture is displayed on a monitor screen) horizontally and vertically. See Fig. 14-10.

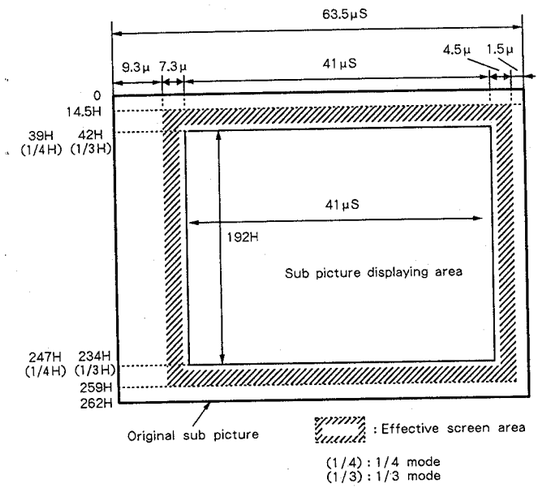


Fig. 14-10

● **Position of the sub picture on the main picture**

A sub picture is displayed at one of the four positions shown in Fig. 14-11 (selectable).

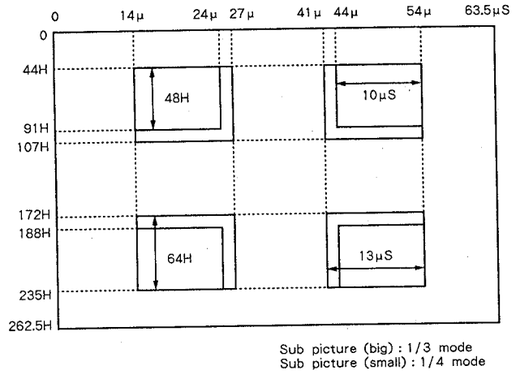


Fig. 14-11

● **Clocks for writing and reading**

To display the sub picture compressed to 1/3 or 1/4, signals are sampled by thinning out by 1/3 or 1/4 vertically. Horizontally the sampling period and reading period is compressed to 1 : 3 or 1 : 4. Therefore the horizontal sampling frequency for writing and the reading frequency are as follows.

Mode	When writing	When reading
1/3	Y : 2.4MHz C.D : 0.6MHz	Y : 7.2MHz C.D : 1.8MHz
1/4	Y : 1.8MHz C.D : 0.45MHz	

Y : Luminance signal
C.D : Color difference signal

The reference clock for writing is 4 × fsc≈14.3MHz, and for reading 4.5 fsc≈16.1MHz while fsc = 3.579545 MHz.

● **Distinguishing and odd field and an even field**

Phase relation between H sync and V sync of a video signal is different between an odd field and an even field. The IC503 and IC502 sync separation circuit detects the signal and controls so that only two types of relation exist. Then they are output as a vertical and horizontal driving signals (VD, HD). Using these signals, fields of the sub picture and main picture are distinguished.

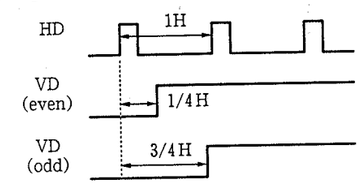


Fig. 14-12 Relations between V. and H. drive signals which were sync separated.

● **Keeping interlace**

As shown in FIg. 14-13, the sub picture signals are written in each address designated for each field after distinguishing the fields. The main picture signal is also distinguished its odd and even fields. According to the result, the sub picture signal corresponding to the field is read from the memory address in which writing is not being executed. Therefore the interlace of the sub picture can be kept with the main picture.

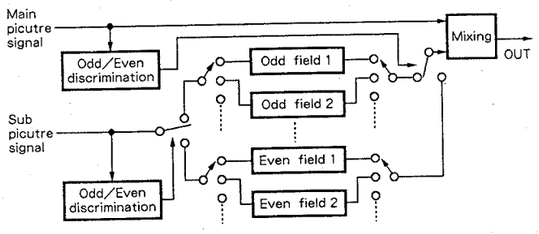


Fig 14-13

14.4 POWER BLOCK

The SD-P503P-QD/KUX1C type uses a switching regulator power supply circuit of the RCC (Ringing Choke Converter) system which has high resistance to a short circuit by load.

1. Basic circuit and operation description

A basic circuit is shown in Fig. 14-14. The circuit operates as follows.

① The input AC power is rectified and input to the switching circuit as V_{IN}.

② In the switching circuit, starting current I_1 flows to the base of the Q651 through the R258 resistor for starting and C715 capacitor. When the starting current I_1 flows, the Q651 is activated, and Ic starts flowing.

③ The Ic linearly increases as shown in Fig. 14-15. On the second side, a starting power is generated at the winding S to make the current Is' flow, but it is blocked by Ds, and the Is' does not flow.

④ At the same time the starting power is also generated at the base drive winding B, and the drive current I_D flows. Then the Q651 is instantaneously set to ON.

⑤ The Ic continues increasing to the point, $I_C = h_{FE} \times I_D$, where is the limut of the base drive current I_D.

⑥ When the increasing curve of the Ic is supperessed, counter electromotive force is generated on the base drive winding B. The V_{BE} of the Q651 is drastically biased invertedly by this counter electromotive force and the Q651 is instantaneously set to OFF.

⑦ At the same time, starting power is generated in the direction reversed in step ③ on the winding S of the second side. The Is flows by this counter electromotive force. While the Is is flowing, starting power is generated in the direction which is biased reversely between base and emitter of the Q651 on the base drive winding B.

⑧ When the starting power of the winding S is lost and the Is does not flow, the starting power of the base drive winding B is also lost. Then the current I_1 flows, and the operation of step ② and after will be repeated, and the switching operation will continue. (Once started, the voltage is induced on the base drive coil by the interacion of coils of the transformer and the Q651 is set to ON again. Therefore switcing will continue even if the R258, C715, D659, C721 and R266 are removed.)

Fig. 14-14 Base circuit of the RCC system

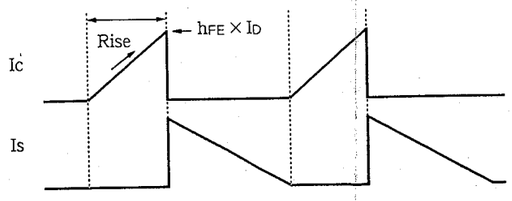


Fig. 14-15 Relations between Ic and Is

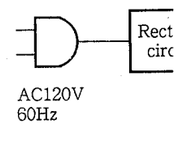
2. Operation d

● **Error detection**

When the change
the change is a
a photocoupler (
charging section
coupled unelectr
are not connecte
photocoupler is
pulse width con
width of the Ic
that the change

● **Overcurrent pr**

When the heater
lines are short-c
FU656 and FU6



14.4 POWER BLOCK

The SD-P503P-QD/KUX1C type uses a switching regulator power supply circuit of the RCC (Ringing Choke Converter) system which has high resistance to a short circuit by load.

1. Basic circuit and operation description

A basic circuit is shown in Fig. 14-14. The circuit operates as follows.

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② In the switching circuit, starting current I_1 flows to the base of the Q651 through the R258 resistor for starting and C715 capacitor. When the starting current I_1 flows, the Q651 is activated, and Ic starts flowing.

③ The Ic linearly increases as shown in Fig. 14-15. On the second side, a starting power is generated at the winding S to make the current Is' flow, but it is blocked by Ds, and the Is' does not flow.

④ At the same time the starting power is also generated at the base drive winding B, and the drive current I_D flows. Then the Q651 is instantaneously set to ON.

⑤ The Ic continues increasing to the point, $I_C = h_{FE} \times I_D$, where is the limut of the base drive current I_D.

⑥ When the increasing curve of the Ic is supperessed, counter electromotive force is generated on the base drive winding B. The V_{BE} of the Q651 is drastically biased invertedly by this counter electromotive force and the Q651 is instantaneously set to OFF.

⑦ At the same time, starting power is generated in the direction reversed in step ③ on the winding S of the second side. The Is flows by this counter electromotive force. While the Is is flowing, starting power is generated in the direction which is biased reversely between base and emitter of the Q651 on the base drive winding B.

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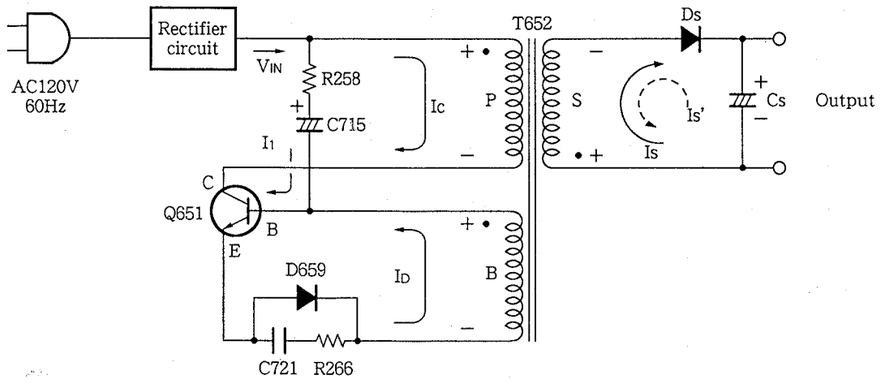

Fig. 14-14 Base circuit of the RCC system

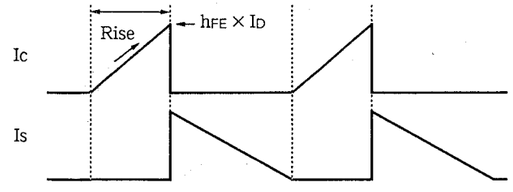

Fig. 14-15 Relations between Ic and Is

2. Operation description of circuits

● Error detection circuit

When the change occurs on 135V on the output side, the change is amplified by the Q662, and input to a photocoupler (IC651) as Ia. In this photocoupler, a charging section and a non-charging section are coupled unelectrically so that GND of both sections are not connected. The error output sent by the IC651 photocoupler is transmitted to the Q652 and Q653 pulse width control circuit. In this circuit, the pulse width of the Ic shown in Fig. 14-15 is changed so that the change of 135V is reduced.

● Overcurrent protection

When the heater power source, 13.5V, +23V and 35V lines are short-circuited by load, fuses, FU652, FU655, FU656 and FU658, are activated.

When 135V line is short-circuited by load, T652 transformer is in magnetic saturation which results in the loss of starting voltage at the base drive coil B of the T652. So the drive current I_D does not flow. On the other hand, the C715 is connected to the R259 starting resistor in series so that charging current for the C715 flows through the R258 only in starting. After starting, the current is not supplied through the R258. This means that the base current is cut, and the Q651 is interrupted and protected.

Once the circuit is cut off, the cutoff condition is kept even if the overload condition is removed. To start again, turn the POWER switch OFF, and ON again.

If the load on +135V line is not so large as to short-circuit but to overload, switching frequency will become extremely low, which results in an abnormal sound. In such case, check the load on the +135V line.

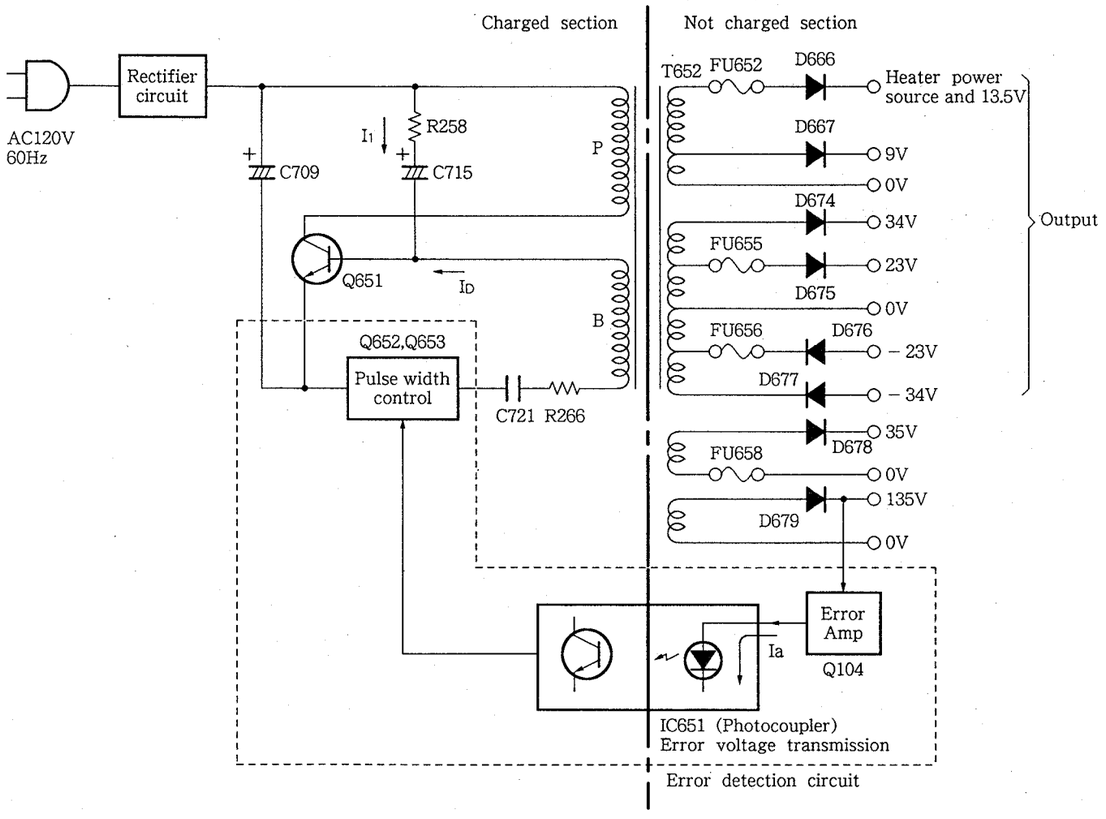

Fig. 14-16 Description of circuits

15. TROUBLE SHOOTING

The projection monitor receiver for the SD-P503P-QD/KUX1C is equipped with various types of protection circuits. When a protection circuit is activated, the relay (RY651), which is used as the power switch, is turned off, so that the power to the set is turned off. If the power is automatically turned off immediately after the power is turned on, a protection circuit may be active.

Once a protection circuit is activated, Q656 functions so that the set cannot be turned on by the power switch on the front panel or on the remote control unit. To check the symptom, be sure to disconnect the AC plug from the AC outlet and wait for about 15 to 20 seconds, then reconnect the plug to the outlet. If the relay (RY651) is not turned on, the AC clock may not be input to pin 9 of IC203 (PDG040).

● Function of the protection circuits

1. X-ray protection circuit

When the anode voltage (normally, max. 31.8kV) is increased abnormally for some reasons, an X-ray may be emitted from the CRT. If the anode voltage is increased abnormally, the circuit detects it and turns off the relay (RY651).

The detection is effectuated by monitoring the output voltage of the coil mounted to pin 3 and pin 4 of F. B. T. (T553) that generates the anode voltage. If the anode voltage is increased, the output voltage of the coil also is increased. The differential amplifier of Q586 and Q587 detects the change in voltage. When the base voltage of Q665 reaches approx. 0.6 to 0.7 V, Q665 is turned on, and turns off Q654 which drives the power switch relay (RY651). The VR555 of the DEFLECTION assembly is adjusted at factory so that the X-ray protection circuit will be activated at the correct level. Repair should be effectuated by replacing the DEFLECTION assembly, and not by replacing the parts marked by × in the schematic diagram.

2. CRT heater voltage detection circuit

The CRT heater voltage is controlled by Q663 and D668, so that it is normally 6.3V. If the heater voltage is increased by some reasons, the life of the CRT will become shorter. If the heater is defective and the current to the heater is excessive, the heater voltage will be dropped. The CRT heater voltage detection circuit also detects this voltage drop to avoid the excessive current.

When the heater voltage is increased, Q665 and D671 will detect it. When the voltage drop occurs due to the excessive current, the voltage at the both ends of R299 (10Ω) will be increased. Q664 monitors this voltage. The output from the CRT heater voltage detection circuit is lead via R283 (2.7kΩ) to the same line as the output from the X-ray protection circuit.

3. + 135V power supply detection circuit

This circuit detects an excessive current to the 135V power line, and an excessive voltage of over 145V to protect the load circuits. If an excessive current is applied to the 135V power line, the voltage drops. When the voltage drops under about 120V, Q660 is turned on, and it turns on Q655 through R284 (3.9kΩ). When Q655 is turned on, Q654 is turned off, then the relay (RY651) is turned off. Q656 functions so that the relay (RY651) cannot be turned on again except when the AC plug is disconnected from the AC outlet and reconnected after about 15 to 20 seconds.

4. Anti-burning circuit of the CRT

If the vertical deflection circuit does not function by some reasons, the CRT will be burnt out with a horizontal line. To prevent this, the output of TP612 (V. R. M.) is monitored by Q607. When no output is detected from TP612 (V. R. M.), Q607 is turned off, and the collector voltage is increased. This collector voltage will be output via D606 to the same line as the output form the X-ray protection circuit.

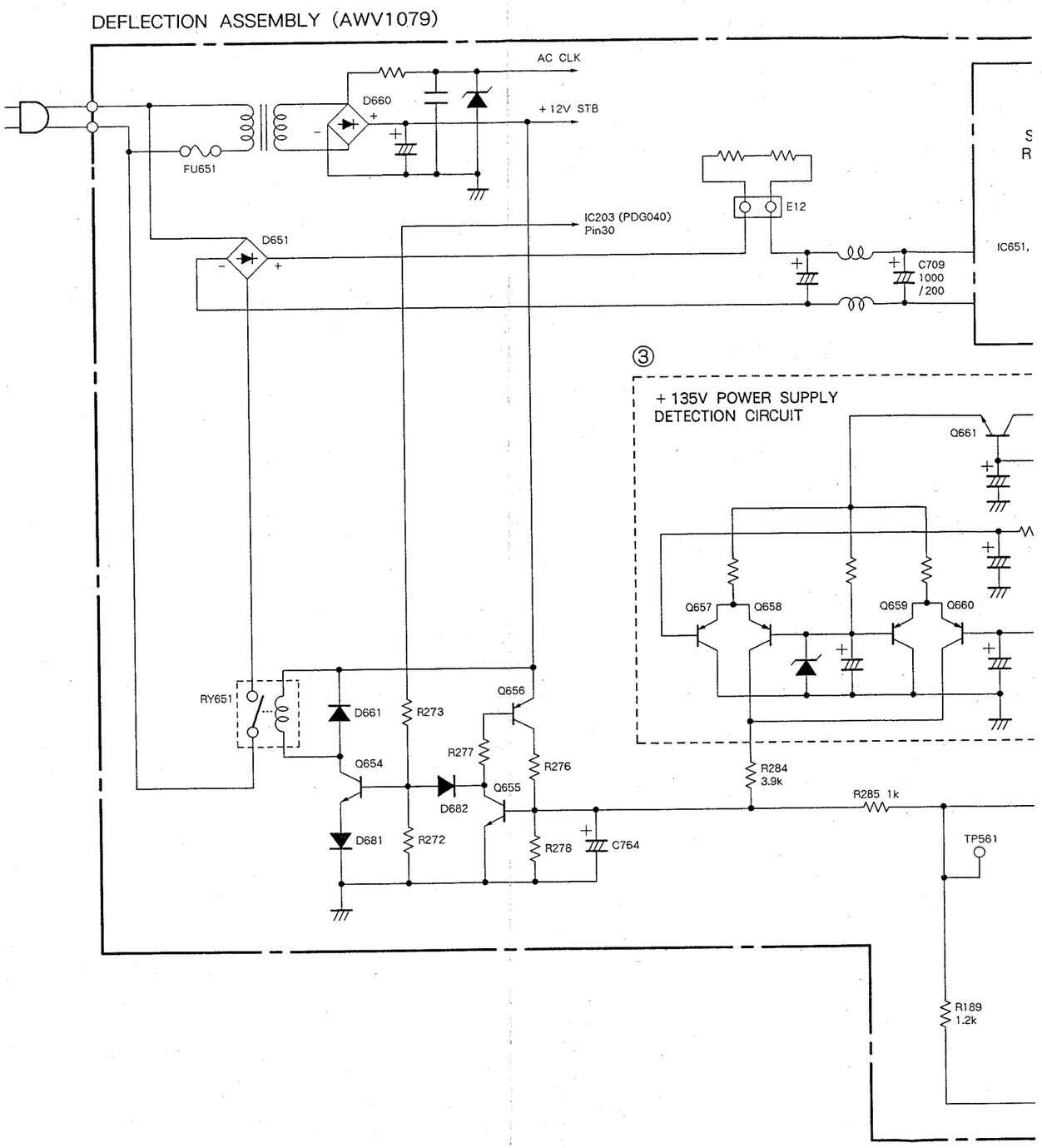

Fig. 15-1 BLOCK DIAGRAM OF PROTECTION CIRCUIT

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heater voltage
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defective and
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heater voltage
oltage drop to

Q665 and D671
occurs due to
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monitors this
heater voltage
Ω) to the same
otection circuit.

cuit
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of over 145V
cessive current
voltage drops.
120V, Q660 is
through R284
Q654 is turned
ned off. Q656
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after about 15

not function by
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is turned off,
. This collector
the same line
ction circuit.

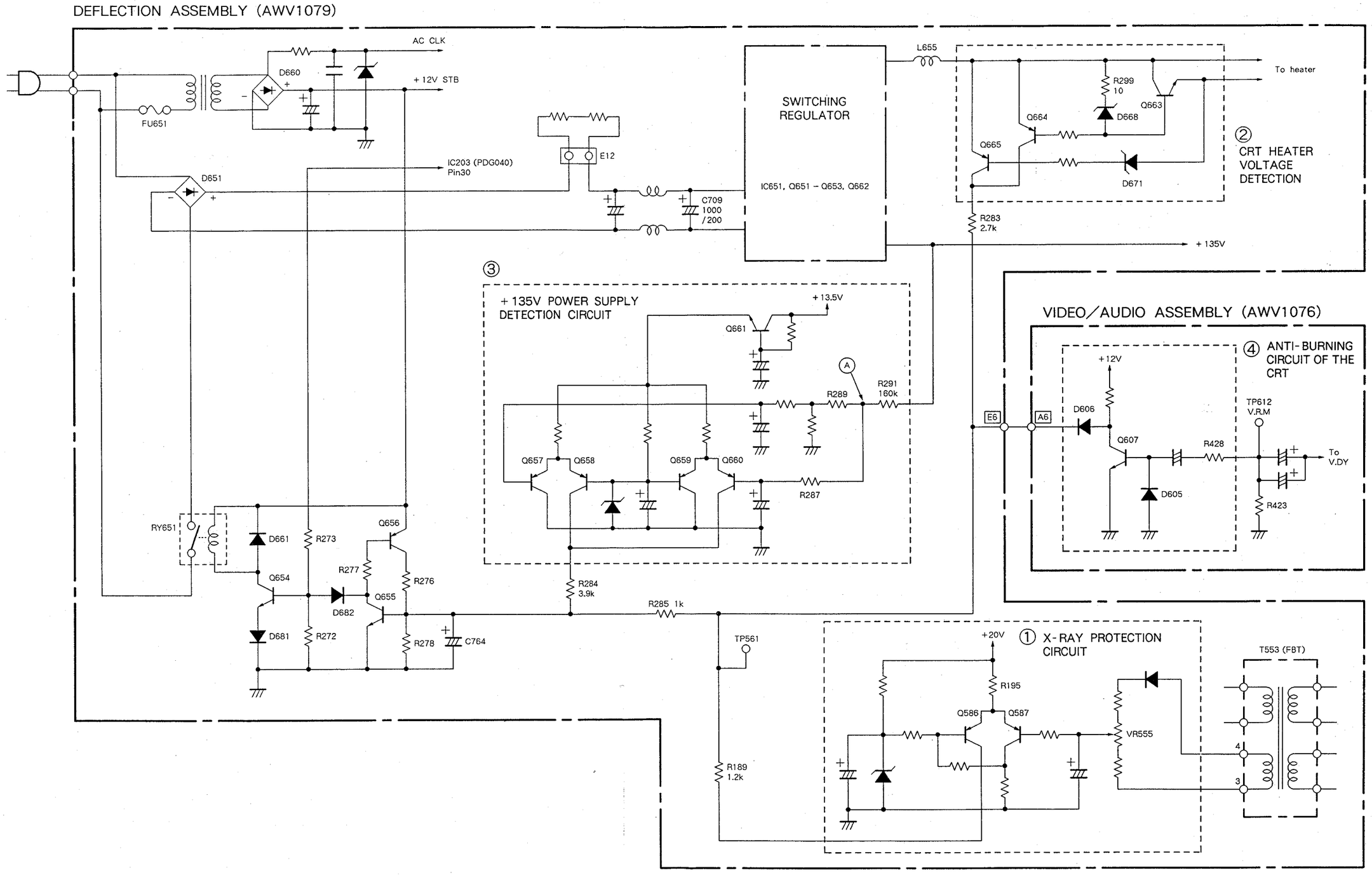
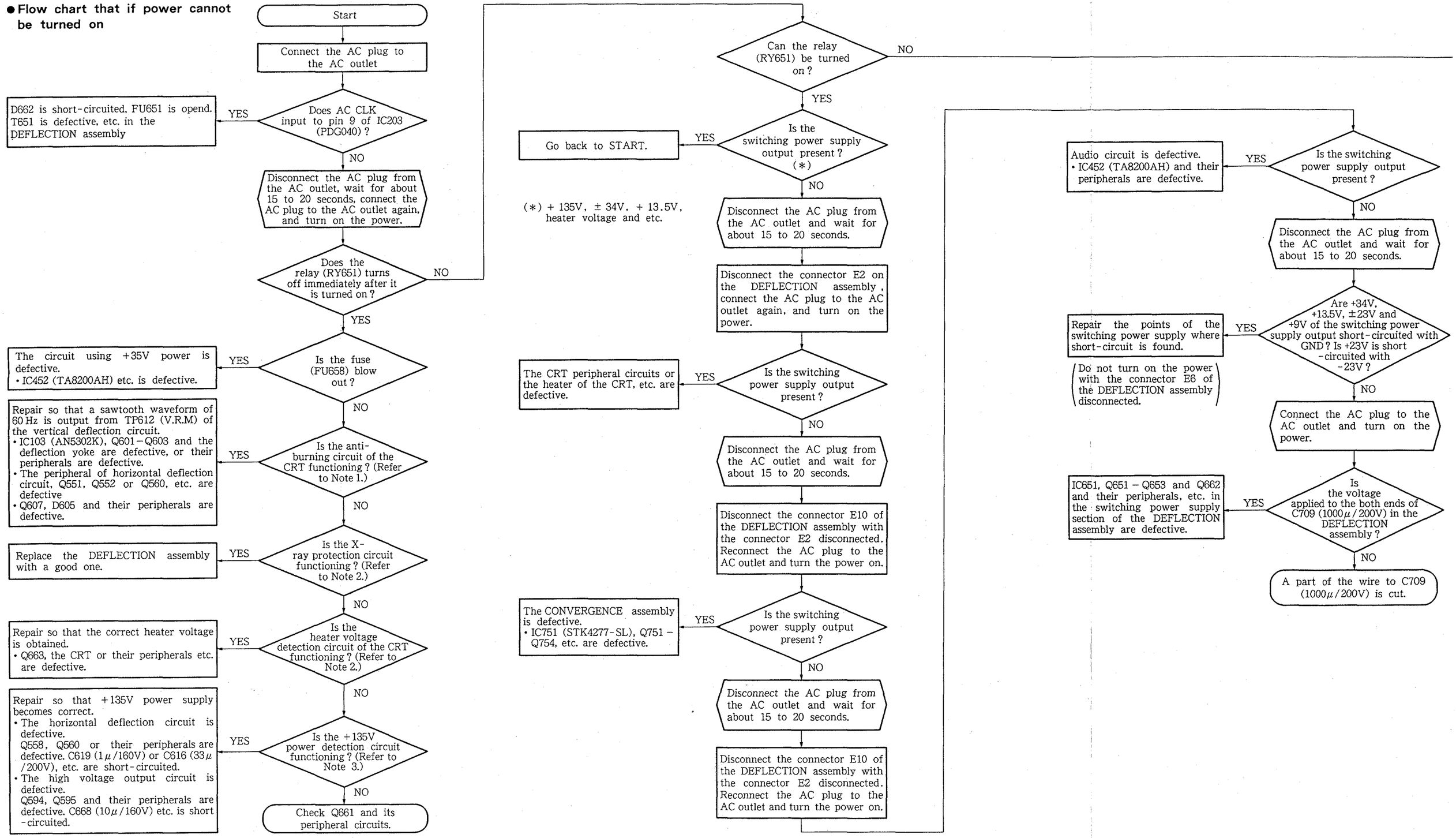
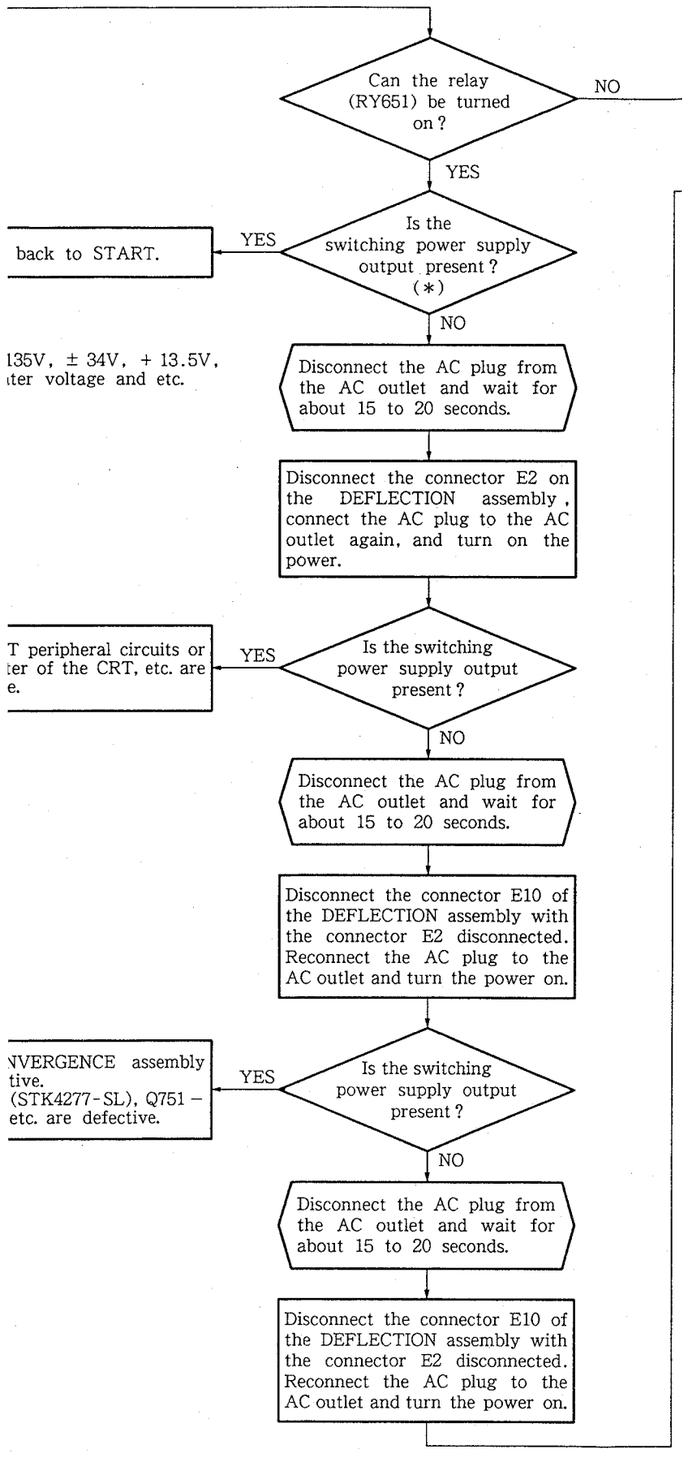
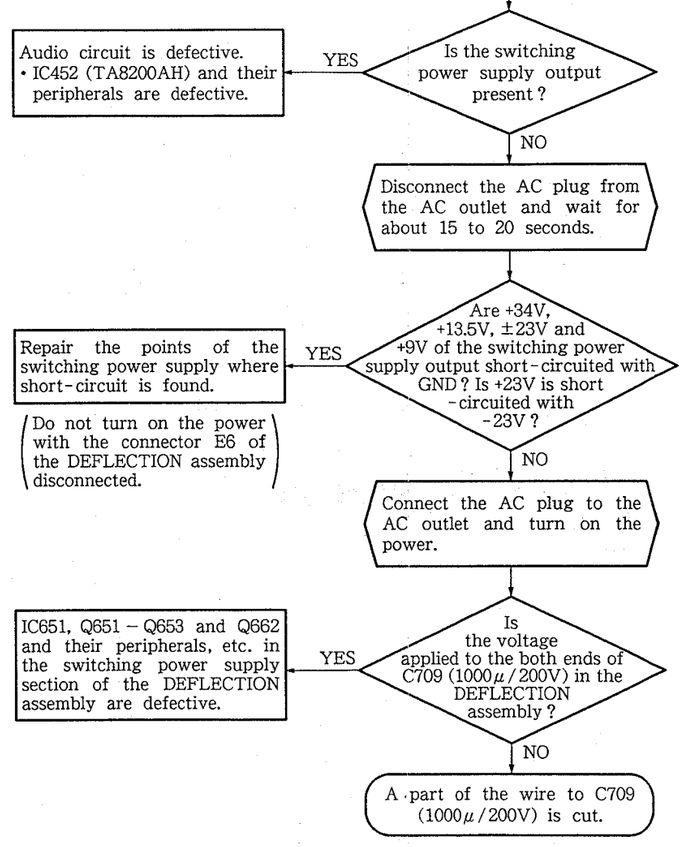


Fig. 15-1 BLOCK DIAGRAM OF PROTECTION CIRCUIT

● Flow chart that if power cannot be turned on







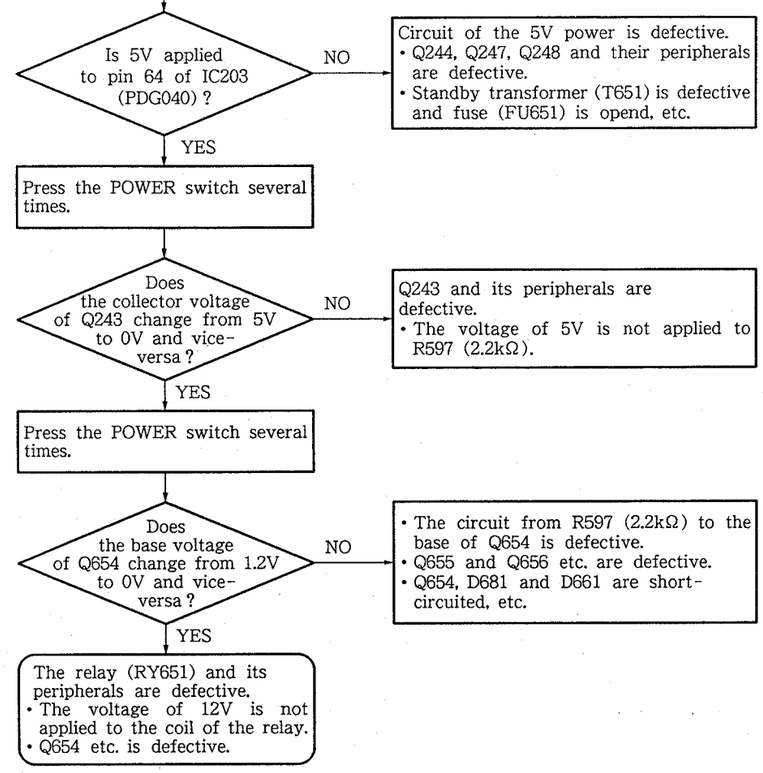


Table 15-1. The relation of each parts and P. C. boards assemblies.

Part No.	Assembly name
IC651 (ON3161-Q) Q551, Q552, Q558, Q560, Q594, Q595 Q651 – Q656, Q661 – Q663 C616 (33μ/200V), C619 (1μ/160V), C668 (10μ/160V) C709 (1000μ/200V) D605, D661, D662, D681 Relay (RY651) Standby transformer (T651) FU651 (8A fuse), FU658 (4A fuse)	DEFLECTION assembly
IC103 (AN5302K), IC203 (PDG040), IC452 (TA8200AH) Q243, Q244, Q247, Q248 Q601 – Q603, Q605, Q607 R597 (2.2kΩ)	VIDEO/AUDIO assembly
IC751 (STK4277-SL) Q751 – Q754 TP612 (V.R.M)	CONVERGENCE assembly
S861 (POWER)	FRONT CONTROL assembly

Note 1

To check if the anti-burning circuit of the CRT is activated

The following operation should be performed so that any protection circuits are not activated during operation. Therefore, the following care should be taken.

- Do not perform this operation except when checking to see if the circuit is activated or not.
- Perform the operation within a short period of time.
- Do not leave away from the set during operation.

To check

1. Disconnect the AC plug from the AC outlet. (For more than 15 to 20 seconds.)
2. Disconnect the connector E2 of the DEFLECTION assembly, so that the power is not fed to the CRT heater. (In order to protect the CRT and avoid X-ray emission.)
3. Short-circuit the both ends of D605 in the VIDEO/AUDIO assembly. (Or short-circuit the base and emitter of Q607.)
4. Connect the AC plug to the AC outlet and turn on the power. If the set is turned on, the anti-burning circuit of the CRT is active. Then you should immediately disconnect the AC plug from the AC outlet and open the short-circuit of the both ends of D605.

Note 2

To check if the X-ray protection circuit or the CRT heater voltage detection circuit are activated

The following operation should be performed so that any protection circuits are not activated during operation. Therefore, the following care should be taken.

- Do not perform this operation except when checking to see if the circuit is activated or not.
- Perform the operation within a short period of time.
- Do not leave away from the set during operation.

To check

1. Disconnect the AC plug from the AC outlet. (For more than 15 to 20 seconds.)
2. Disconnect the connector E2 of the DEFLECTION assembly, so that the power is not fed to the CRT heater. (In order to protect the CRT and avoid X-ray emission.)
3. Short-circuit TP561 and GND (TP556) in the DEFLECTION assembly.
4. Connect the AC plug to the AC outlet and turn on the power. If the set is turned on, either of the X-ray protection circuit or the CRT heater voltage detection circuit is active.
5. Measure the collector voltage of Q586 in the DEFLECTION assembly. If it is more than 1.2V, the X-ray protection circuit is active.
6. Measure the collector voltage of Q664 and Q665 in the DEFLECTION assembly. If it is more than 1.2V, the anti-burning circuit of the CRT is active. Then you should immediately disconnect the AC plug from the AC outlet and open the short-circuit of TP561 and GND (TP556).

Note 3

To check if the +135V power supply detection circuit is activated

The following operation should be performed so that any protection circuits are not activated during operation. Therefore, the following care should be taken.

- Do not perform this operation except when checking to see if the circuit is activated or not.
- Perform the operation within a short period of time.
- Do not leave away from the set during operation.

To check

1. Disconnect the AC plug from the AC outlet. (For more than 15 to 20 seconds.)
2. Disconnect the connector E2 of the DEFLECTION assembly, so that the power is not fed to the CRT heater. (In order to protect the CRT and avoid X-ray emission.)
3. Short-circuit the lead of R291 (160kΩ), which is not connected to +135V power, in the DEFLECTION assembly (marked by Ⓐ in the protection circuit block diagram) with GND.
4. Connect a DC voltmeter (capable of measuring 135V) between TP652 and GND in the DEFLECTION assembly.
5. While monitoring the DC voltmeter, connect the AC plug to the AC outlet and turn on the power. If the set is turned on and the DC voltmeter indicates less than 120V or more than 145V, the +135V power supply detection circuit is active. Then you should immediately disconnect the AC plug from the AC outlet and open the short-circuit between R291 (160kΩ) and GND.

16. WIRING DIAGRAM

When reassembling the wiring rods of this set once disassembled, be sure to recover the styling of wiring rods as it was. The wiring rods that are the most important for styling are the focus screen wires, the anode cable, and jumper wires connecting P2 to N3 and N2 to M3. The following wiring diagram is provided only for reference, and subject to possible changes without notice. Care should be taken so that the wiring rods styling of this set is recovered as it was before disassembling.

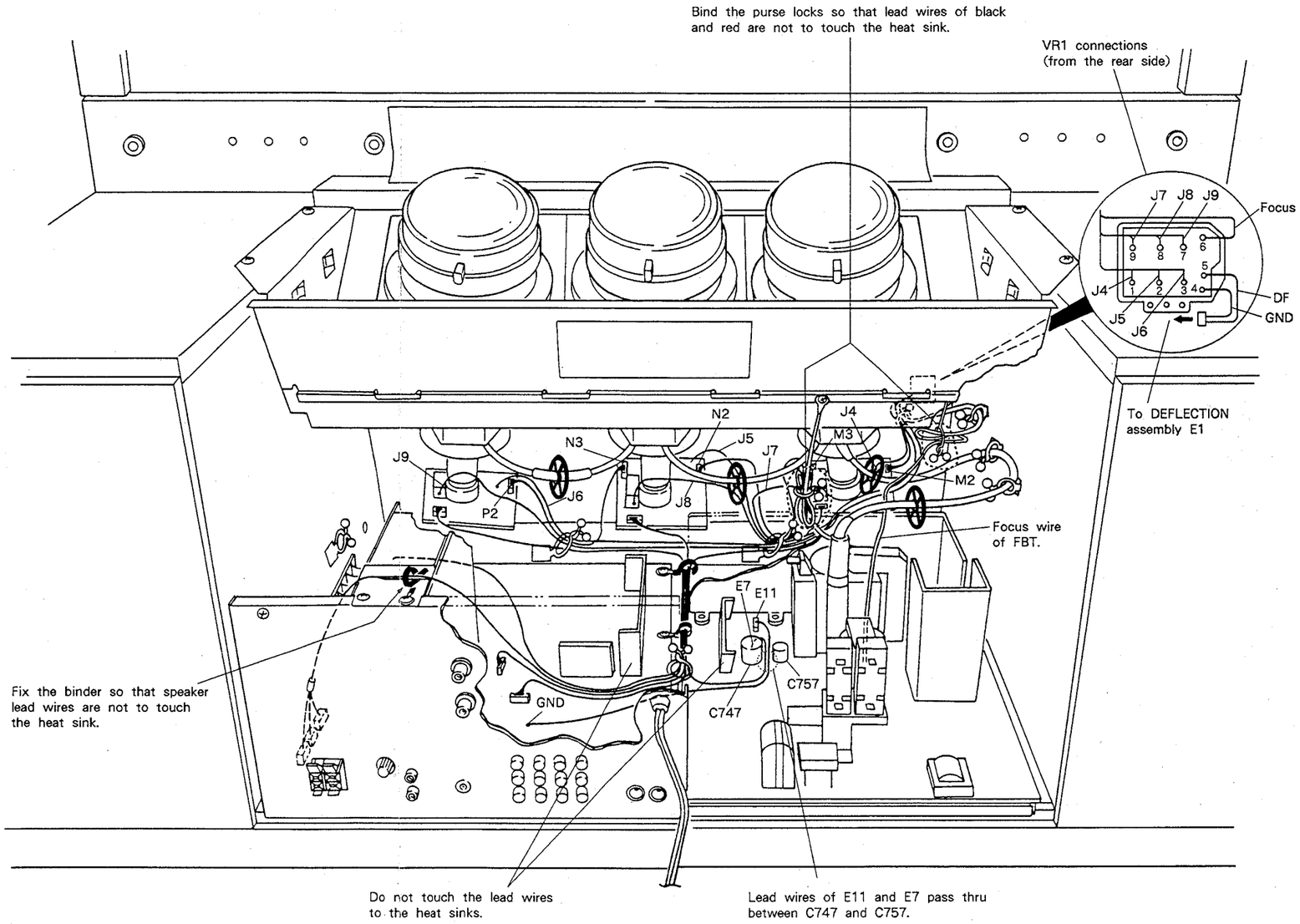


Fig. 16-1 Wiring diagram (1)

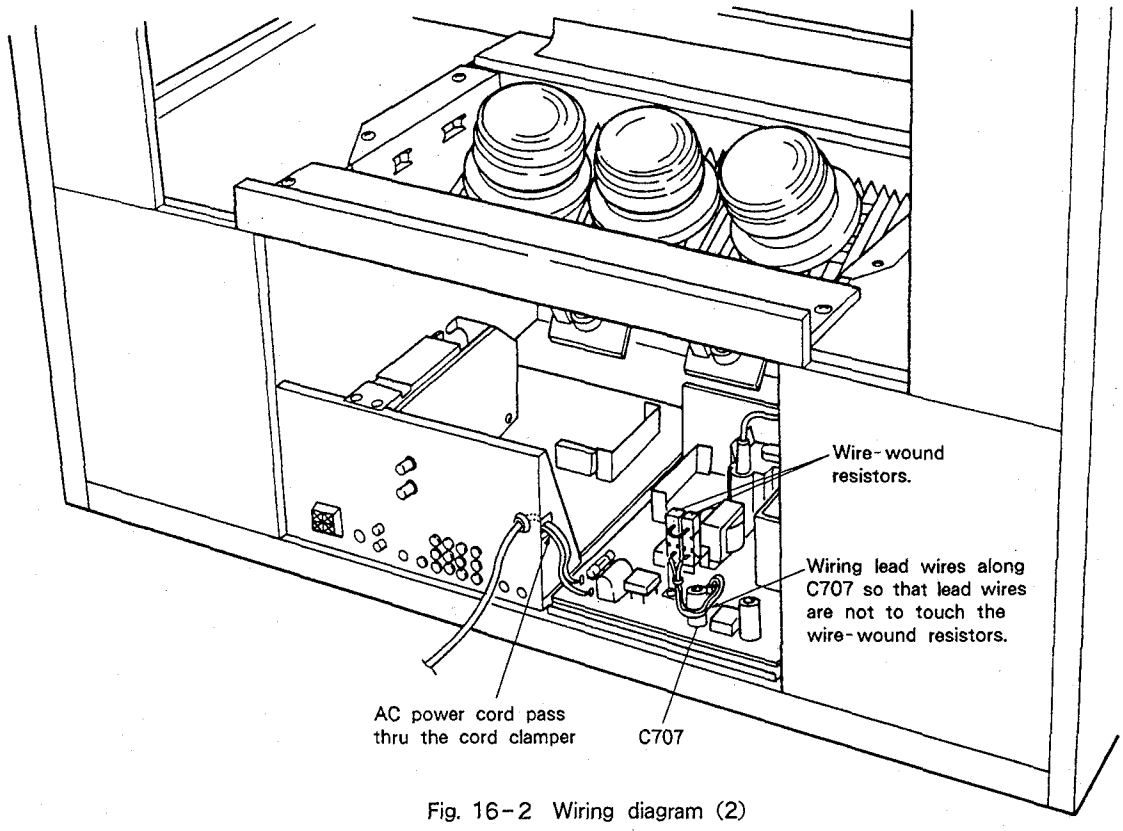


Fig. 16-2 Wiring diagram (2)

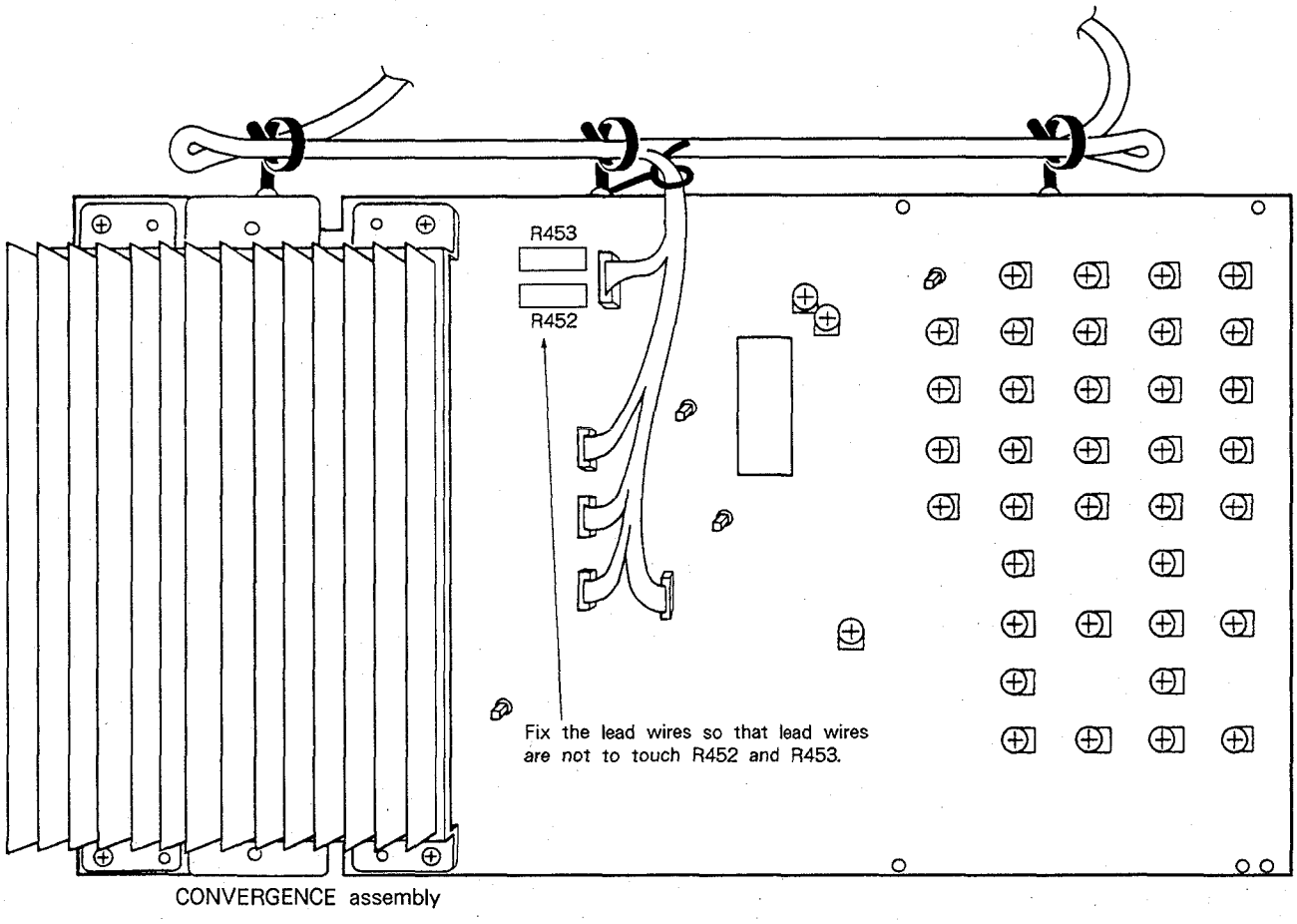


Fig. 16-3 CONVERGENCE assembly

VIDEO/AUDIO assembly

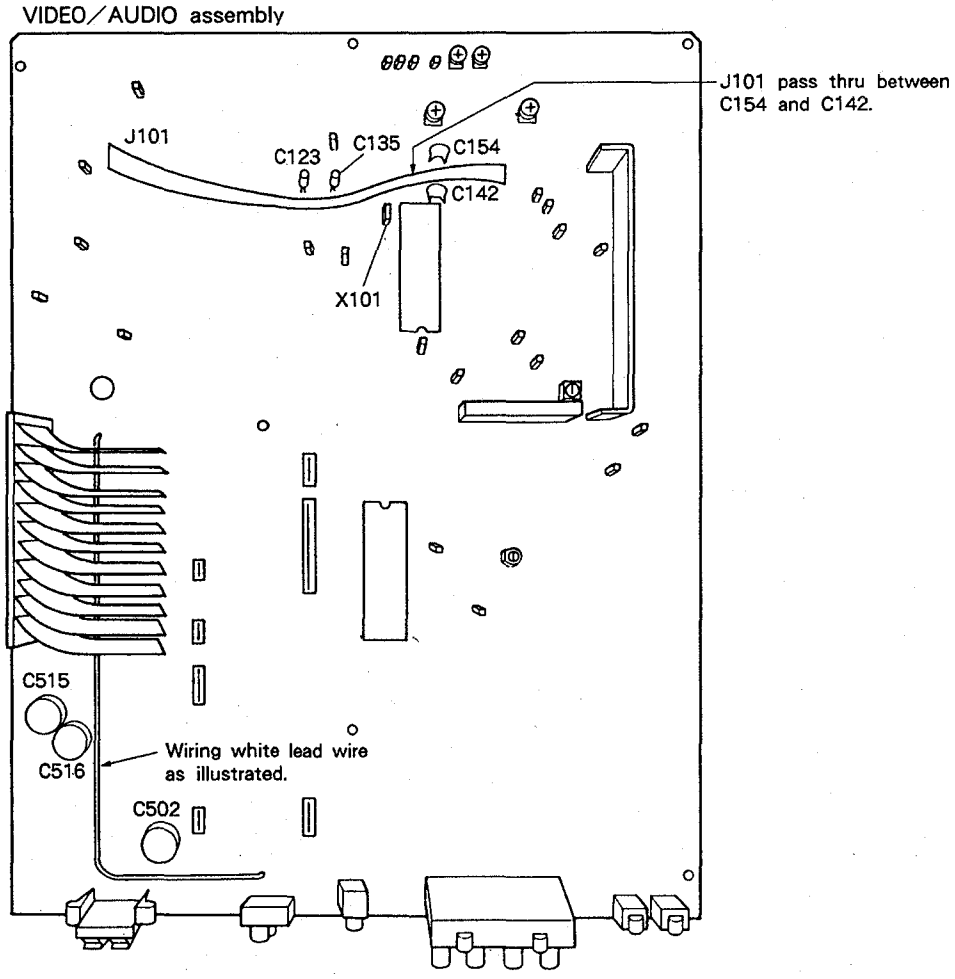


Fig. 16-4 VIDEO/AUDIO assembly

17. FOR SD-P503P-Q, SD-P503P-WD, SD-P503P-W, SD-P503P-R, SD-P453P-Q AND SD-P453P-W /KUX1C TYPES

NOTES :
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- Parts marked by ☆ are important parts which use X – rays. If any of these parts need to be replaced, always replace with specified parts.
- Parts having the (T) mark are for the KUX1C type manufactured by Harvey Manufacturing, Inc., and parts having the (L) mark are for the KUX1C type manufactured by PIONEER ELECTRONICS TECHNOLOGY, INC.

17.1 CONTRAST OF MISCELLANEOUS PARTS

The SD-P503P-Q, SD-P503P-WD and SD-P503P-W/KUX1C types are the same as the SD-P503P-QD/KUX1C type with the exception of the following sections.

Mark	Symbol & Description	Part No.				Remarks
		SD-P503P-QD /KUX1C type	SD-P503P-Q /KUX1C type	SD-P503P-WD /KUX1C type	SD-P503P-W /KUX1C type	
	Upper carton	AHD1664	AHD1687	AHD1723	AHD1724	For packing
	Under carton	AHD1665	AHD1667	AHD1665	AHD1667	For packing
	Magnet catch	Non supply	• • • • •	Non supply	• • • • •	
	Grille-QD	Non supply	• • • • •	• • • • •	• • • • •	
	Grille-WD	• • • • •	• • • • •	Non supply	• • • • •	
	Grille 50	• • • • •	Non supply	• • • • •	Non supply	
	Catch plate	Non supply	• • • • •	Non supply	• • • • •	
	Hinge A	Non supply	• • • • •	Non supply	• • • • •	
	Hinge B	Non supply	• • • • •	Non supply	• • • • •	
	Cabinet	Non supply	Non supply	Non supply	Non supply	

The SD-P503P-R, SD-P453P-Q and SD-P453P-W/KUX1C types are the same as the SD-P503P-QD/KUX1C type with the exception of the following sections.

Mark	Symbol & Description	Part No.				Remarks
		SD-P503P-QD /KUX1C type	SD-P503P-R /KUX1C type	SD-P453P-Q /KUX1C type	SD-P453P-W /KUX1C type	
	Door assembly	AAN1136	AAN1136	AAN1137	AAN1137	
	Spacer H	AAP1063	AAP1063	AAP1094	AAP1094	
	Spacer L	AAP1069	AAP1069	AAP1095	AAP1095	
	Screen frame H	AAP1085	AAP1085	AAP1088	AAP1088	
	Screen frame V	AAP1087	AAP1087	AAP1090	AAP1090	
	Lead wire cushion	Non supply	• • • • •	• • • • •	• • • • •	
	Upper carton	AHD1664	AHD1725	AHD1668	AHD1772	For packing
	Under carton	AHD1665	AHD1667	AHD1669	AHD1669	For packing
	Side panel assembly	AMB1497	AMB1497	AMB1498	AMB1498	
	Magnet catch	Non supply	• • • • •	• • • • •	• • • • •	
	Mirror	AMR1521	AMR1521	AMR1522	AMR1522	
	Fresnel lens	AMR1703	AMR1703	AMR1704	AMR1704	
	Lenticular sheet	AMR1706	AMR1706	AMR1707	AMR1707	
	Grille-QD	Non supply	• • • • •	• • • • •	• • • • •	
	Grille 45	• • • • •	• • • • •	Non supply	Non supply	
	Grille 50	• • • • •	Non supply	• • • • •	• • • • •	
	Catch plate	Non supply	• • • • •	• • • • •	• • • • •	
	Hinge A	Non supply	• • • • •	• • • • •	• • • • •	
	Hinge B	Non supply	• • • • •	• • • • •	• • • • •	
⚠	CRT assembly R	AWY1058	AWY1058	AWY1060	AWY1060	
⚠	CRT assembly B	AWY1059	AWY1059	AWY1061	AWY1061	
	Rubber cushion	Non supply	Non supply	• • • • •	• • • • •	
	End panel (M)	• • • • •	Non supply	• • • • •	• • • • •	
	Top panel (M)	• • • • •	Non supply	• • • • •	• • • • •	
	Top front rail	• • • • •	Non supply	• • • • •	• • • • •	
	Waist rail	• • • • •	Non supply	• • • • •	• • • • •	
	Bottom front rail	• • • • •	Non supply	• • • • •	• • • • •	
	Cabinet	Non supply	Non supply	Non supply	Non supply	

18. FOR SD-P503FP-Q, PRO-92, SD-P453FP-Q AND PRO-72/KUX1C TYPES

NOTES :
- Parts without part number cannot be supplied.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

  Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).
  560 Ω → 56 × 10¹ → 561 ..... RD1/4PS 5 6 1 J
  47k Ω → 47 × 10³ → 473 ..... RD1/4PS 4 7 3 J
  0.5 Ω → 0R5 ..... RN2H 0 R 5 K
  1 Ω → 010 ..... RS1P 0 1 0 K

  Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).
  5.62k Ω → 562 × 10¹ → 5621 ..... RN1/4SR 5 6 2 1 F
- Parts marked by ☆ are important parts which use X-rays. If any of these parts need to be replaced, always replace with specified parts.
- Parts having the (T) mark are for the KUX1C type manufactured by Harvey Manufacturing, Inc., and parts having the (L) mark are for the KUX1C type manufactured by PIONEER ELECTRONICS TECHNOLOGY, Inc.

18.1 CONTRAST OF MISCELLANEOUS PARTS

The SD-P503FP-Q, PRO-92, SD-P453FP-Q and PRO-72/KUX1C types are the same as the SD-P503P-QD/KUX1C type with the exception of the following sections.

Mark	Symbol & Description	Part No.					Remarks
		SD-P503P-QD /KUX1C type	SD-P503FP-Q /KUX1C type	PRO-92 /KUX1C type	SD-P453FP-Q /KUX1C type	PRO-72 /KUX1C type	
	VIDEO/AUDIO assembly	AWV1076	AWV1088	AWV1087	AWV1088	AWV1087	
	FRONT INPUT TERMINAL assembly	AWZ2542	AWZ2542	AWZ2560	AWZ2542	AWZ2560	
	Door assembly	AAN1136	AAN1146	AAN1157	AAN1147	AAN1158	
	Spacer H	AAP1063	AAP1063	AAP1063	AAP1094	AAP1094	
	Spacer L	AAP1069	AAP1069	AAP1069	AAP1095	AAP1095	
	Screen frame H	AAP1085	AAP1085	AAP1085	AAP1088	AAP1088	
	Screen frame V	AAP1087	AAP1087	AAP1087	AAP1090	AAP1090	
	Rubber cushion	Non supply	Non supply	Non supply	.....	.....	
	Upper carton	AHD1664	AHD1690	AHD1688	AHD1681	AHD1689	For packing
	Under carton	AHD1665	AHD1691	AHD1667	AHD1682	AHD1669	For packing
	Side panel assembly	AMB1497	AMB1545	AMB1545	AMB1546	AMB1546	
	Front panel assembly	AMB1510	AMB1547	AMB1547	AMB1547	AMB1547	
	Magnet catch	Non supply	.....	.....	.....	.....	
	Mirror	AMR1521	AMR1521	AMR1521	AMR1522	AMR1522	
	Fresnel lens	AMR1703	AMR1703	AMR1703	AMR1704	AMR1704	
	Lenticular sheet	AMR1706	AMR1706	AMR1706	AMR1707	AMR1707	
	Grille-DRV	.....	Non supply	.....	Non supply	.....	
	Grille-QD	Non supply	.....	.....	.....	.....	
	Cover panel	.....	Non supply	.....	Non supply	.....	
	Attachment C	.....	Non supply	.....	Non supply	.....	
	Attachment R	.....	Non supply	.....	Non supply	.....	
	Attachment L	.....	Non supply	.....	Non supply	.....	
	Catch plate	Non supply	.....	.....	.....	.....	
	Hinge A	Non supply	.....	.....	.....	.....	
	Hinge B	Non supply	.....	.....	.....	.....	
⚠	CRT assembly R	AWY1058	AWY1058	AWY1058	AWY1060	AWY1060	
⚠	CRT assembly B	AWY1059	AWY1059	AWY1059	AWY1061	AWY1061	
	Operating instructions (English)	.....	ARB1208	ARB1208	ARB1208	ARB1208	
	Operating instructions (English)	ARB1187	ARB1187	ARB1198	ARB1187	ARB1198	
	Operating instructions (English)	ARB1188	ARB1188	ARB1199	ARB1188	ARB1199	
	Technical note	.....	.....	ARB1200	.....	ARB1200	
	Lens assembly D	.....	.....	AWL1032	.....	AWL1032	
	Lens assembly RD	.....	.....	AWL1033	.....	AWL1033	
	Grille 50	.....	.....	Non supply	.....	.....	
	Grille 45	.....	.....	.....	.....	Non supply	
	Cabinet	Non supply	Non supply	Non supply	Non supply	Non supply	
	Screw	.....	BMZ40P120FZB	.....	BMZ40P120FZB	.....	For attachment

VIDEO/AUDIO ASSEMBLY (AWV1088) AND (AWV1087)

The VIDEO/AUDIO assembly (AWV1088) and (AWV1087) is the same as the VIDEO/AUDIO assembly (AWV1076) with the exception of the following sections.

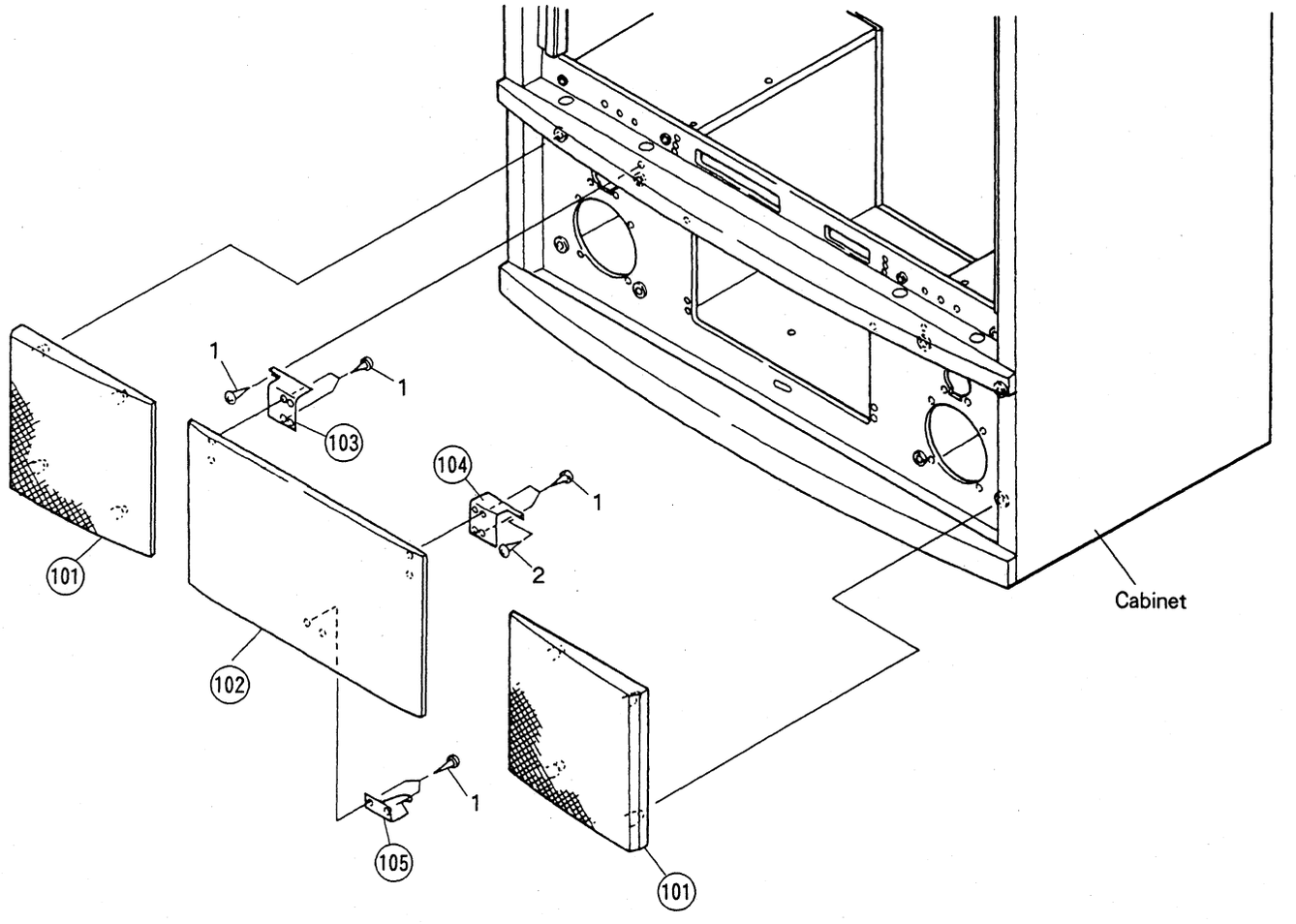
Mark	Symbol & Description	Part No.			Remarks
		AWV1076	AWV1088	AWV1087	
	Q402,Q403	• • • • •	2SC1740S	2SC1740S	
	Q404	• • • • •	2SA933S	2SA933S	
	D217,D904	• • • • •	1SS252	1SS252	
	C457	• • • • •	CEAS102M10	CEAS102M10	
	C489	• • • • •	CEAS220M16	CEAS220M16	
	R856	• • • • •	RD1/8PM750J	RD1/8PM750J	
	R857,R893	• • • • •	RD1/8PM103J	RD1/8PM103J	
	R862	RD1/8PM682J	RD1/8PM133J	RD1/8PM133J	
	R883,R884	• • • • •	RD1/8PM104J	RD1/8PM104J	
	R885,R886	• • • • •	RD1/8PM102J	RD1/8PM102J	
	R889,R890	• • • • •	RD1/8PM474J	RD1/8PM474J	
	R891,R892	• • • • •	RD1/8PM223J	RD1/8PM223J	
	R894	• • • • •	RD1/8PM473J	RD1/8PM473J	
	R943,R944	• • • • •	RD1/8PM222J	RD1/8PM222J	
	R945	• • • • •	RD1/8PM101J	RD1/8PM101J	
	3P pin jack	• • • • •	AKB1021	AKB1115	
	2P pin jack	AKB1039	AKB1039	AKB1052	
	12P pin jack	AKB1094	AKB1094	AKB1114	
	4P mini DIN socket	AKP1016	AKP1016	AKP1051	

FRONT INPUT TERMINAL ASSEMBLY (AWZ2560)

The FRONT INPUT TERMINAL assembly (AWZ2560) is the same as the FRONT INPUT TERMINAL assembly (AWZ2542) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		AWZ2542	AWZ2560	
	1P pin jack	AKB-104	AKB1111	
	1P pin jack	AKB-105	AKB1112	
	1P pin jack	AKB-106	AKB1113	

18.2 EXPLODED VIEW OF SD-P503FP-Q and SD-P453FP-Q/KUX1C TYPES



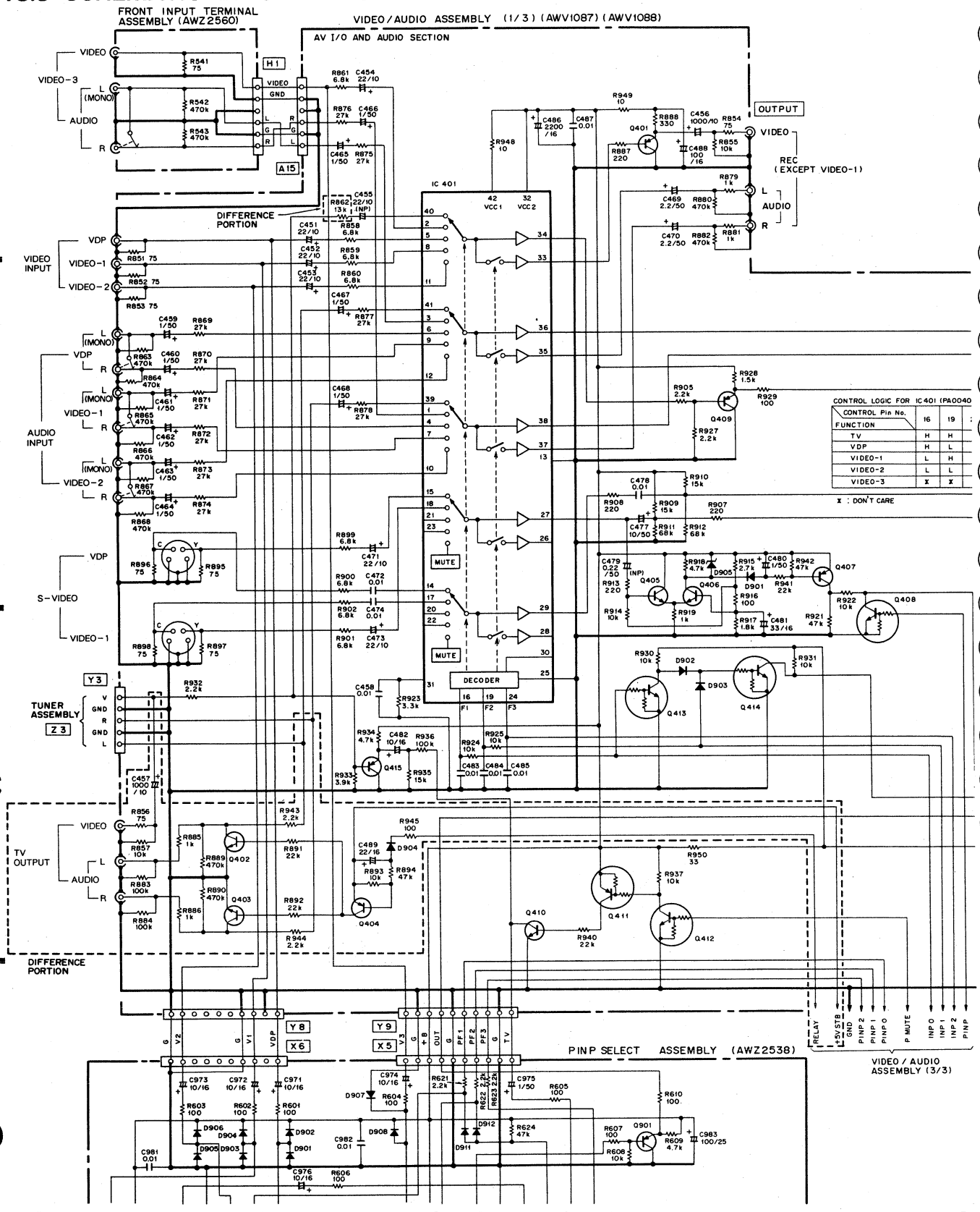
NOTES :
- Parts without part number cannot be supplied.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

Parts List

Mark	No.	Part No.	Description
	1	BYC35P160FZK	Screw
	2	BMZ40P120FZB	Screw

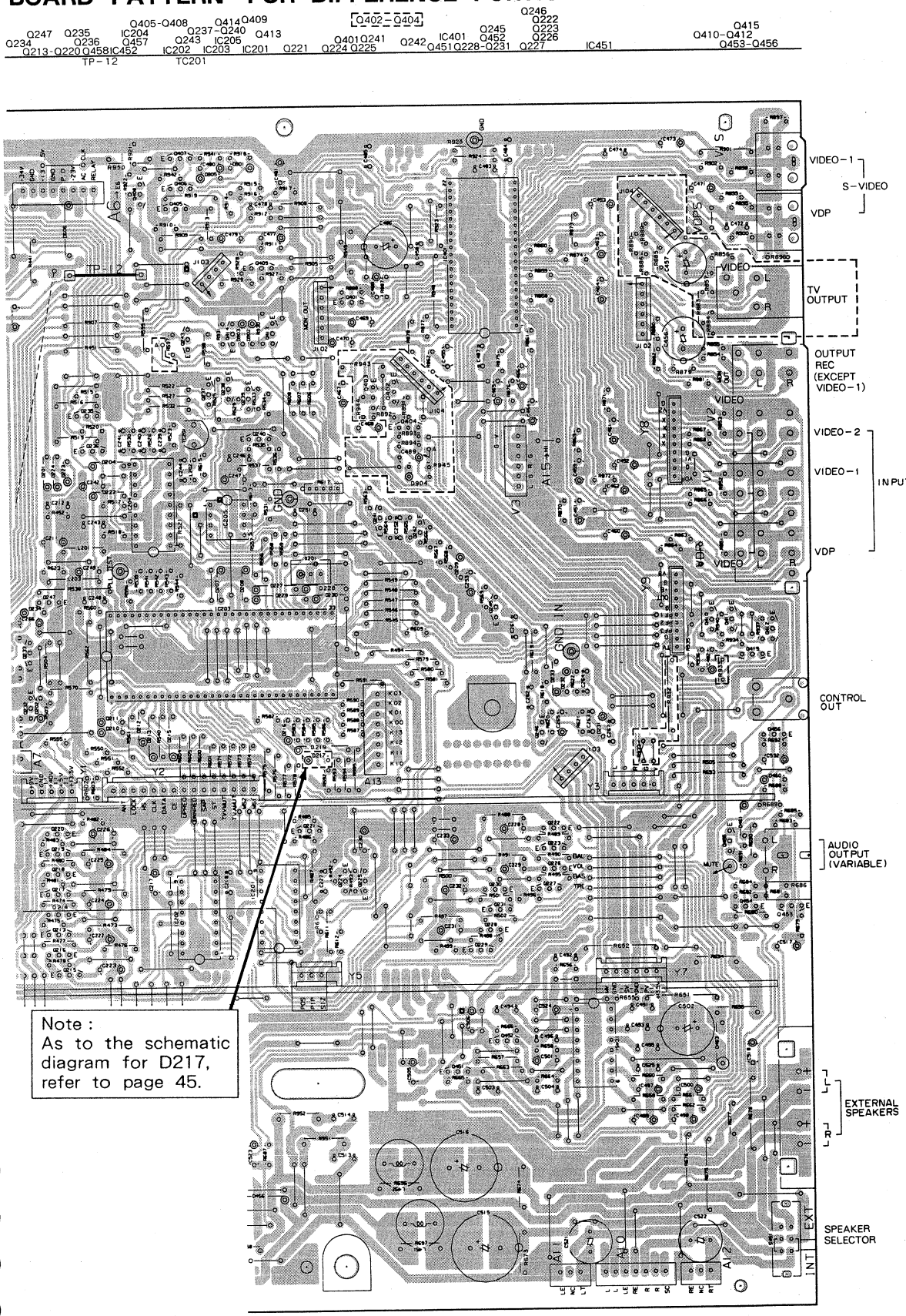
Mark	No.	Part No.	Description
	101		Grille DRV
	102		Cover panel
	103		Attachment R
	104		Attachment L
	105		Attachment C

18.3 SCHEMATIC DIAGRAM FOR DIFFERENCE PORTION



Note : The different portions from VIDEO/AUDIO assembly (AWV1076) are showed in the portion enclosed with dotted line.

18.4 P.C. BOARD PATTERN FOR DIFFERENCE PORTION



Note : The different portions from VIDEO/AUDIO assembly (AWV1076) are showed in the portion enclosed with dotted line.

This P. C. B. connection diagram is viewed from the foil side.

18.4 P.C. BOARD PATTERN FOR DIFFERENCE PORTION

Note : The different portions from VIDEO\AUDIO assembly (AWV1076) are showed in the portion enclosed with dotted line.

19. FOR SD-P503S-Q AND SD-P453S-Q/KUX1C TYPES

NOTES :
- Parts without part number cannot be supplied.
- Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

  Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5 %, and K = 10 %).

  560 Ω → 56 × 10^1 → 561 ····· RD1/4PS 5 6 1 J
  47k Ω → 47 × 10^3 → 473 ····· RD1/4PS 4 7 3 J
  0.5 Ω → 0R5 ····· RN2H 0 R 5 K
  1 Ω → 010 ····· RS1P 0 1 0 K

  Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

  5.62k Ω → 562 × 10^1 → 5621 ····· RN1/4SR 5 6 2 1 F
- Parts marked by ☆ are important parts which use X − rays.
  If any of these parts need to be replaced, always replace with specified parts.
- Parts having the (T) mark are for the KUX1C type manufactured by Harvey Manufacturing, Inc., and parts having the (L) mark are for the KUX1C type manufactured by PIONEER ELECTRONICS TECHNOLOGY, Inc.

19.1 CONTRAST OF MISCELLANEOUS PARTS

The SD-P503S-Q AND SD-P453S-Q/KUX1C types are the same as the SD-P503P-QD/KUX1C type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		SD-P503P-QD /KUX1C type	SD-P503S-Q /KUX1C type	SD-P453S-QD /KUX1C type	
	VIDEO/AUDIO assembly	AWV1076	AWV1077	AWV1077	
☆	DEFLECTION assembly	AWV1079	AWV1080	AWV1080	
	PINP SELECT assembly	AWZ2538	• • • • •	• • • • •	
	FRONT CONTROL assembly	AWZ2539	AWZ2540	AWZ2540	
	PINP assembly	AWV1086	• • • • •	• • • • •	
	SURROUND assembly	• • • • •	AWV1085	AWV1085	
	Door assembly	AAN1136	AAN1138	AAN1139	
	Upper carton	AHD1664	AHD1666	AHD1670	For packing
	Under carton	AHD1665	AHD1667	AHD1669	For packing
	Front panel assembly	AMB1510	AMB1496	AMB1496	
	Magnet catch	Non supply	• • • • •	• • • • •	
	Grille-QD	Non supply	• • • • •	• • • • •	
	Grille 50	• • • • •	Non supply	• • • • •	
	Catch plate	Non supply	• • • • •	• • • • •	
	Hinge A	Non supply	• • • • •	• • • • •	
	Hinge B	Non supply	• • • • •	• • • • •	
	Speaker (High-range)	APT1004	• • • • •	• • • • •	
	Operating instructions (English)	ARB1187	ARB1191	ARB1191	
	Remote control unit	AXD1106	AXD1107	AXD1107	
	Spacer H	AAP1063	AAP1063	AAP1094	
	Spacer L	AAP1069	AAP1069	AAP1095	
	Screen frame H	AAP1085	AAP1085	AAP1088	
	Screen frame V	AAP1087	AAP1087	AAP1090	
	Rubber cushion	Non supply	Non supply	• • • • •	
	Side panel assembly	AMP1497	AMB1497	AMB1498	
	Mirror	AMR1521	AMR1521	AMR1522	
	Fresnel lens	AMR1703	AMR1703	AMR1704	
	Lenticular sheet	AMR1706	AMR1706	AMR1707	
	Grille 45	• • • • •	• • • • •	Non supply	
⚠	CRT assembly R	AWY1058	AWY1058	AWY1060	
⚠	CRT assembly B	AWY1059	AWY1059	AWY1061	
	Cabinet	Non supply	Non supply	Non supply	

VIDEO/AUDIO ASSEMBLY (AWV1077)

The VIDEO/AUDIO assembly (AWV1077) is the same as the VIDEO/AUDIO assembly (AWV1076) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		AWV1076	AWV1077	
	Q409,Q415	2SA933S	• • • • •	
	Q410	2SC1740S	• • • • •	
	Q411	RN2203	• • • • •	
	Q412	RN1203	• • • • •	
	D218	• • • • •	1SS252	
	D219	1SS252	• • • • •	
	C482	CEJA100M16	• • • • •	
	C517,C518	CEAS010M50	• • • • •	
	C519,C520	• • • • •	CEAS2R2M50	
	C521,C522 (3.3μ/63V)	ACH1127	• • • • •	
	R611,R927,R936	RD1/8PM222J	• • • • •	
	R651,R652,R940	RD1/8PM223J	• • • • •	
	R653,R654	• • • • •	RD1/8PM223J	
	R675,R676	RD1/8PM822J	• • • • •	
	R677,R678	RD1/8PM102J	• • • • •	
	R905	RD1/8PM222J	RD1/8PM221J	
	R928	RD1/8PM152J	• • • • •	
	R929	RD1/8PM101J	• • • • •	
	R934	RD1/8PM472J	• • • • •	
	R935	RD1/8PM153J	• • • • •	
	R937	RD1/8PM103J	• • • • •	
	R950	RD1/4PMFL330J	RD1/4PMFL390J	

☆DEFLECTION ASSEMBLY (AWV1080)

The DEFLECTION assembly (AWV1080) is the same as the DEFLECTION assembly (AWV1079) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		AWV1079	AWV1080	
	D667	RL2Z	• • • • •	
	L670,L671 Ferrite bead	ATX-028	• • • • •	
	C737	CEHAQ102M16	• • • • •	
	C750	CCDSL221K500	• • • • •	
	C766	CKCYX473M25	• • • • •	

Note : As to the schematic diagram, refer to pages from 39 to 41.

FRONT CONTROL ASSEMBLY (AWZ2540)

The FRONT CONTROL assembly (AWZ2540) is the same as the FRONT CONTROL assembly (AWZ2539) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		AWZ2539	AWZ2540	
	S876 Slide switch (SPEAKER SELECTOR)	• • • • •	ASH1026	

SURROUND Assembly (AWV1085)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
	IC508,IC510	BU4066BL
	IC507	LA2730
	IC504	LM3364K-15
	IC503	M50199P
	IC501,IC505,IC506	M5218L
	IC509	M5222L
	IC502	M5233P
	Q512 – Q515	DTA124ES
	Q501,Q503,Q507,Q508	2SA933S
	Q502,Q505,Q506,Q509,Q510,Q516	2SC1740S
⚠	Q504	2SC3064
	D508,D509	RD15ESB3
	D507	RD5.1ESB
	D501 – D506,D510,D511	1SS252

COIL AND FILTER

Mark	Symbol & Description	Part No.
	L501	LAU101K
	F501 EMI filter	ATF1060

CAPACITORS

Mark	Symbol & Description	Part No.
	C537	CCMSL220J50
	C562	CCMSL470J50
	C551	CEANP100M50
	C542	CEANP4R7M35
	C566	CEASR33M50
	C582	CEASR68M50
	C556,C558,C560,C561,C569,C571, C574,C577,C578	CEAS010M50
	C535,C536,C538,C553,C573, C589 – C591,C597	CEAS100M50
	C539,C546,C570,C587	CEAS101M16
	C572	CEAS102M16
	C531,C579,C580,C585	CEAS2R2M50
	C565,C592,C598	CEAS220M16
	C576	CEAS221M10
	C581,C586	CEAS221M16
	C583	CEAS330M16
	C588	CEAS4R7M50
	C547	CEAS470M10
	C545	CEAS470M16
	C543	CFTXA103J50
	C544,C550,C567	CFTXA104J50
	C563,C568	CFTXA333J50
	C533,C534	CFTXA393J50
	C532	CFTXA473J50
	C548,C549	CFTXA823J50
	C594	CKCYX103M25
	C584,C593,C595	CKDYB102K50
	C596	CKDYB472K50
	C559	CKMYB471K50
	C564	CQMA472J50
	C540,C554	CQMA562J50
	C557,C575	CQMA682J50
	C555	CQMA822J50
	C541,C552	CQSA561J50

RESISTORS

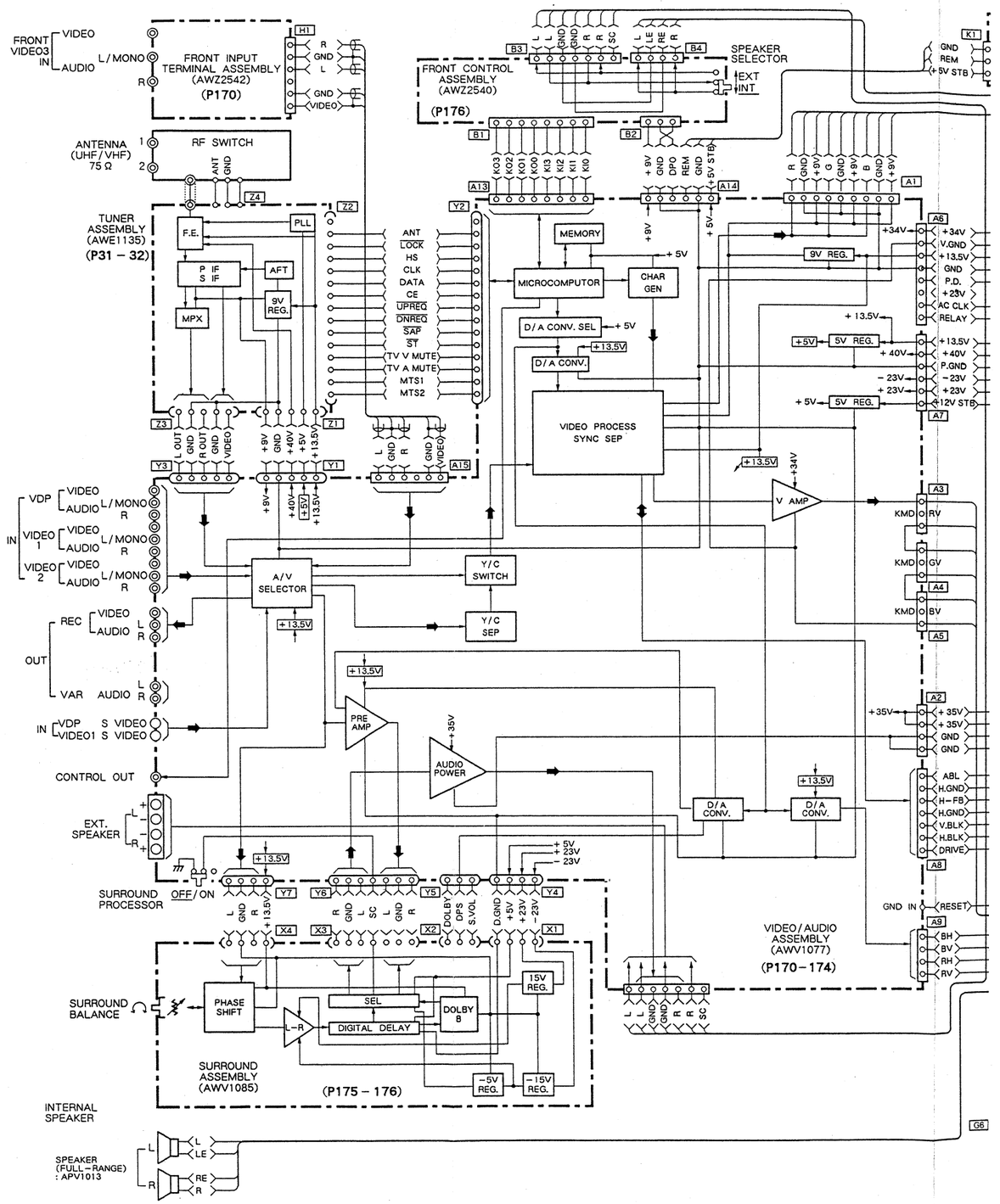
Mark	Symbol & Description	Part No.
	VR501 Variable resistor (100k × 2) (SURROUND BALANCE)	ACT1055
	VR502 Semi-fixed (22kΩ)	VRTB6VS223
⚠	R1600	RD1/2PMFL221J
⚠	R1602	RD1/4PMFL100J
	R1599,R1601,R1603	RD1/4PMFL□□□J
	R1598	RD1/4PM821J
	Other resistors	RD1/8PM□□□J

OTHERS

Mark	Symbol & Description	Part No.
	X501 Ceramic resonator (3.27MHz)	ASS1016

19.2 SCHEMATIC DIAGRAMS

1. OVERALL WIRING DIAGRAM



19.2 SCHEMATIC DIAGRAMS

1. OVERALL WIRING DIAGRAM

No.

XA823J50
YX103M25
YB102K50
YB472K50
YB471K50

A472J50
A562J50
A682J50
A822J50
A561J50

No.

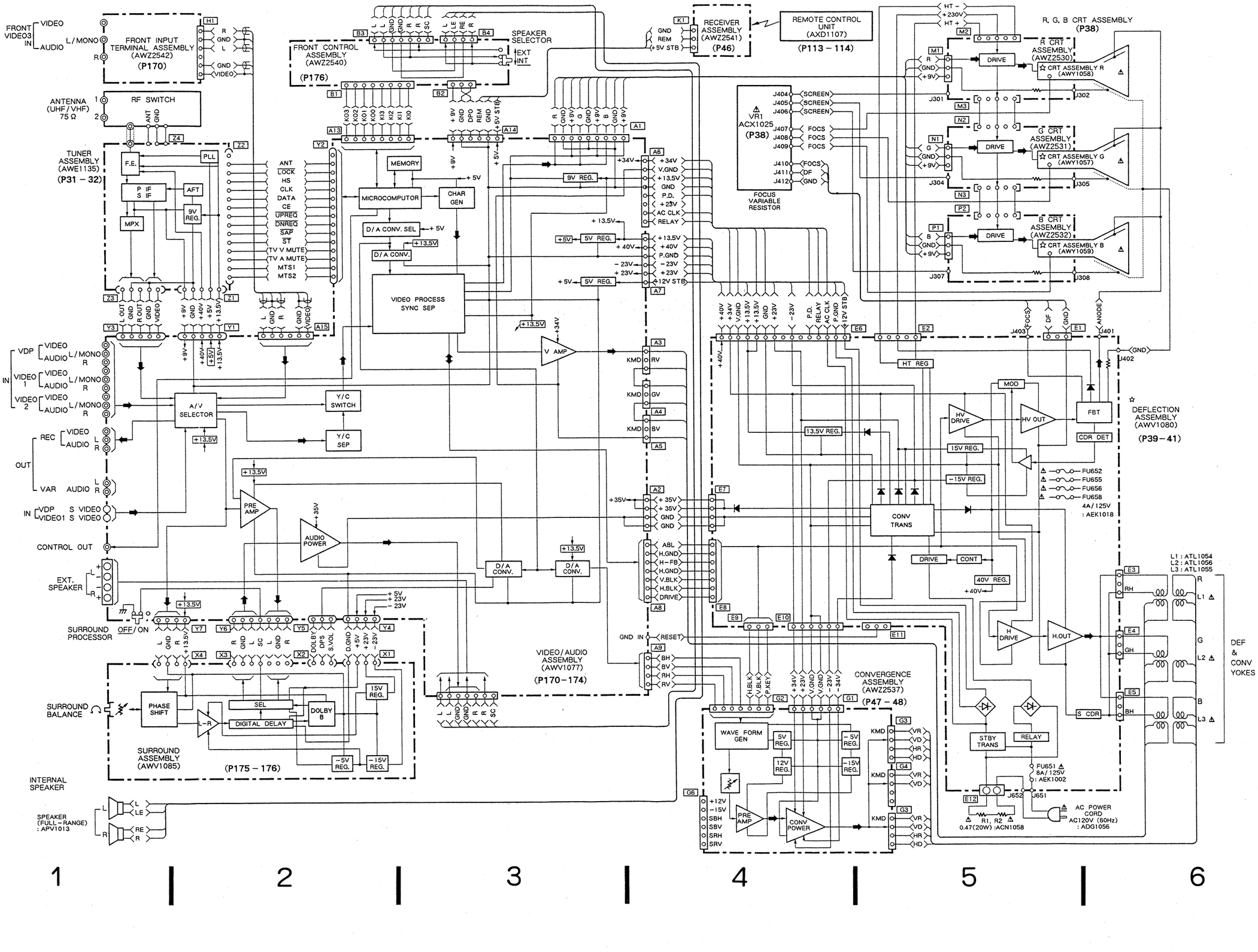
1055

B6VS223
/2PMFL221J

/4PMFL100J
/4PMFL□□□J
/4PM821J
/8PM□□□J

No.

1016



2. VIDEO/AUDIO (1/3), FRONT INPUT TERMINAL, FRONT CONTROL (3/3) ASSEMBLIES

1. RESISTORS :
Indicated in Ω, 1/4W, 1/6W and 1/8W, ± 5% tolerance unless otherwise noted k ; kΩ, M ; MΩ, (F) ; ± 1%, (G) ; ± 2%, (K) ; ± 10%, (M) ; ± 20% tolerance.

2. CAPACITORS :
Indicated in capacity (μF) / voltage (V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.

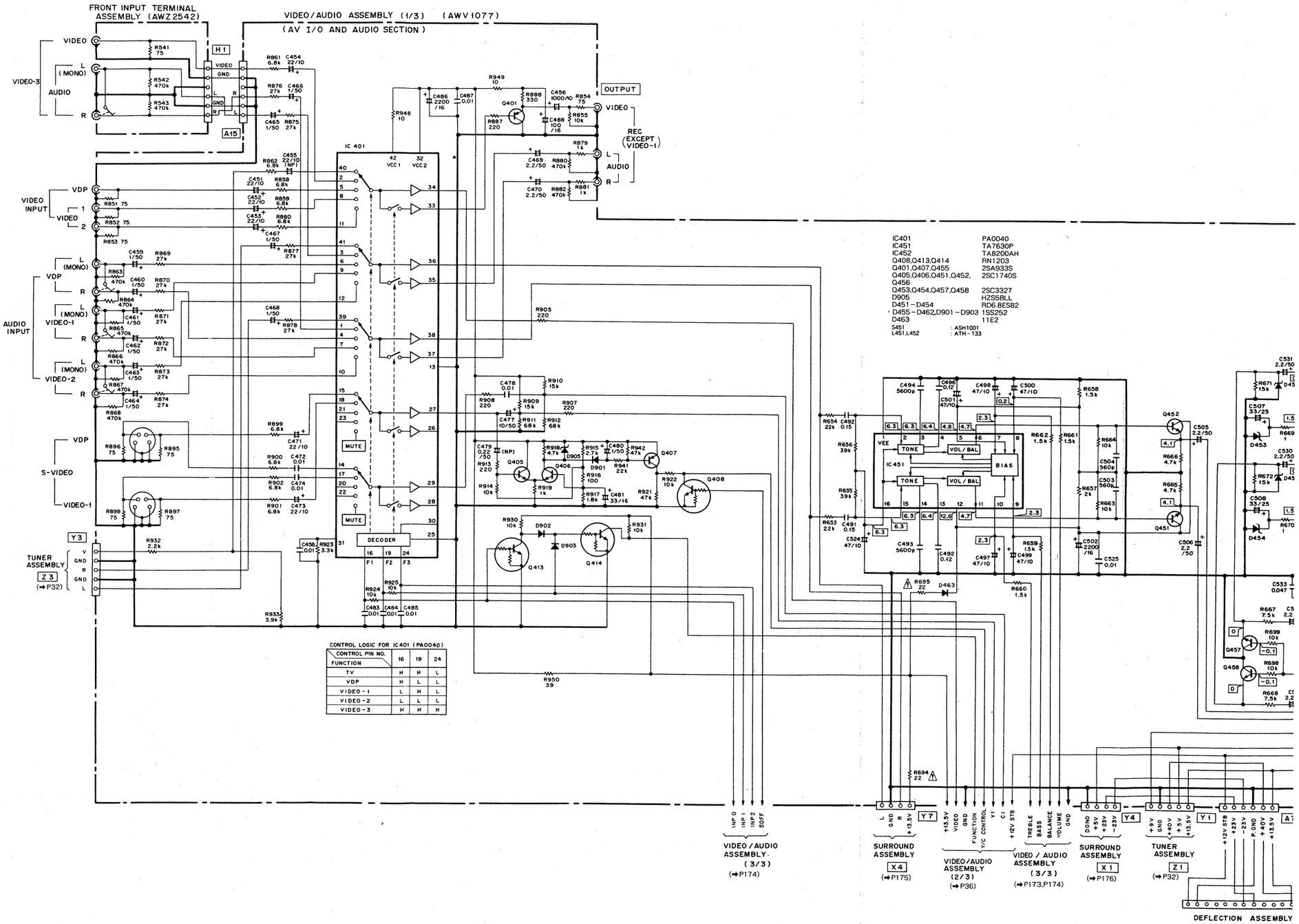
3. VOLTAGE, CURRENT :
▭ ; DC voltage (V) at no input signal without notice.
Value in ( ) is color bar signal input state.
⇦mA ; DC current at no input signal without notice.

4. OTHERS :
➡ ; Signal route.
⊘ ; Adjusting point.

- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- ※ marked capacitors and resistors have parts numbers.
- Parts marked by ☆ are important parts which use X-rays. If any of these parts need to be replaced, always replace with specified parts.
- Parts marked by × are important parts which use X-rays. If a failure occurs in any of these parts, replace the printed circuit board assembly where the relevant part has already been adjusted as a working component. Do not replace the actual part itself.
If any part marked by × is replaced, there is danger of being exposed to X-rays.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

SWITCHES : (The underlined indicates the switch position)
VIDEO/AUDIO ASSEMBLY
S451 : BUILT – IN SURROUND PROCESSOR ON – OFF
FRONT CONTROL ASSEMBLY
S861 : POWER
S862 : ANTENNA
S863 : FACTORY ADJ MODE
S864 : INPUT SELECTOR
S865 : –] CHANNEL
S866 : +]
S867 : –] VOLUME
S868 : +]
S869 : SELECT] PRESET MENU
S870 : SET]
S871 : STD/AV MEM
S872 : DPO
S873 : NOT USED
S874 : NOT USED
S875 : ON/OFF – PRESET MENU
S876 : SPEAKER SELECTOR INT (SURROUND OFF) – EXT



BLIES

VIDEO/AUDIO ASSEMBLY (1/3) (AWV1077)
(AV I/O AND AUDIO SECTION)

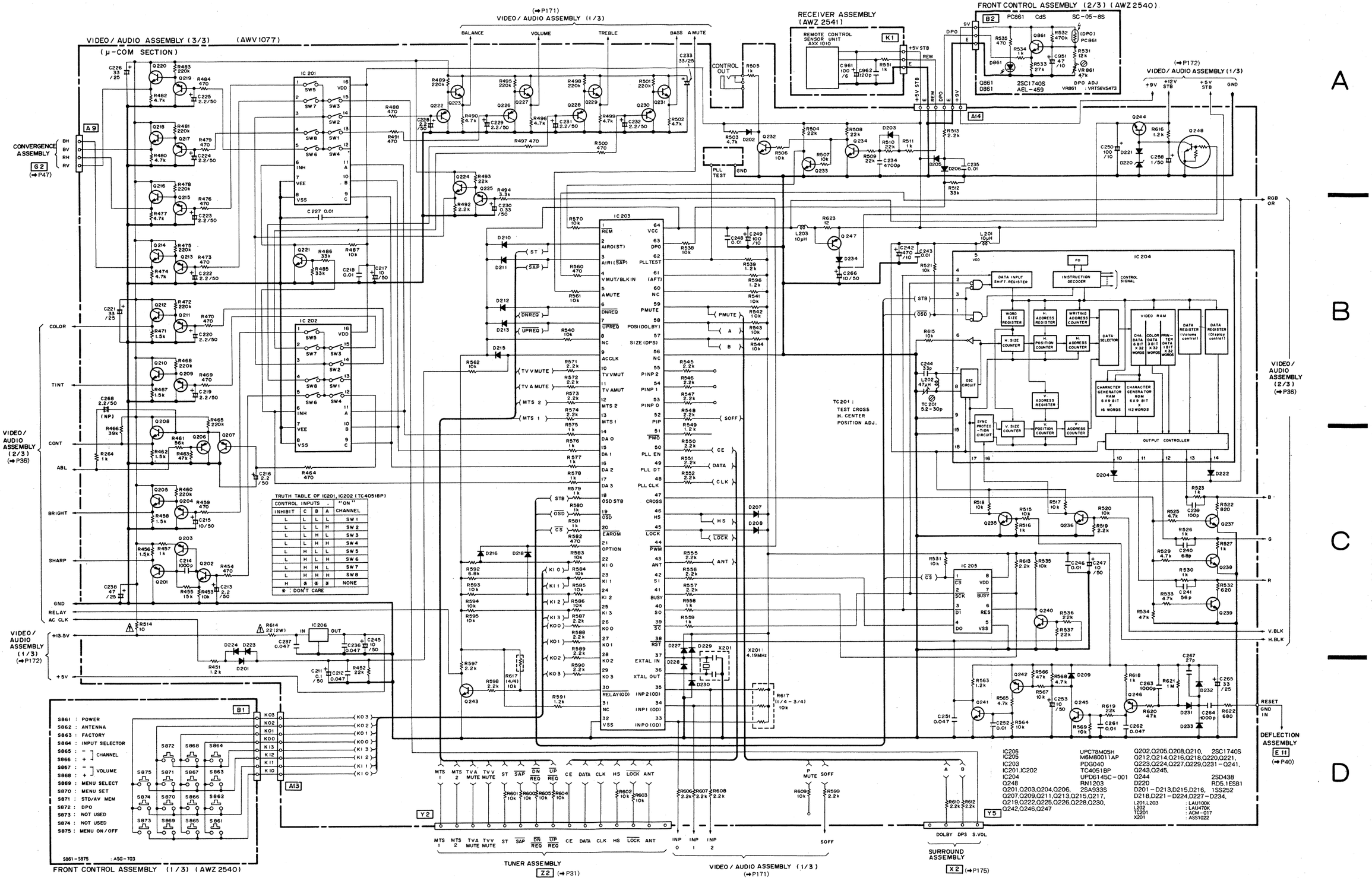
Note : The VIDEO/AUDIO assembly (2/3) (AWV1077) is the same as that of AWV1076.
As to the VIDEO/AUDIO assembly (AWV1077), refer to pages from 36 to 38.

IC401	PA0040
IC451	TA7630P
IC452	TA8200AH
Q408,Q413,Q414	RN1203
Q401,Q407,Q455	2SA933S
Q405,Q406,Q451,Q452, Q456	2SC1740S
Q453,Q454,Q457,Q458	2SC3327
D905	HZS5BLL
D451 – D454	RD6.8ESB2
D455 – D462,D901 – D903	1SS252
D463	11E2
S451	: ASH1001
L451,L452	: ATH – 133

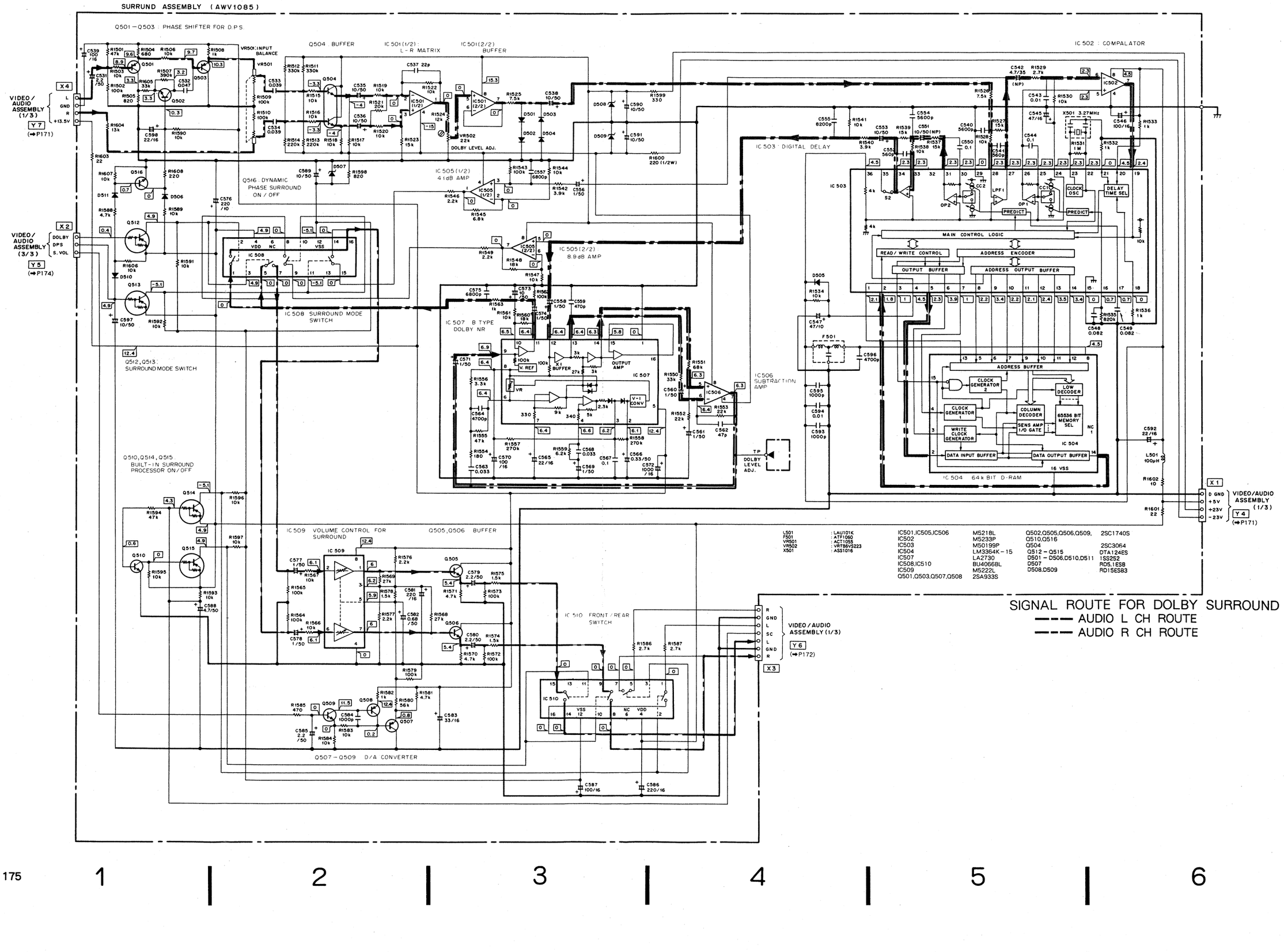
CONTROL LOGIC FOR IC401 (PA0040)

CONTROL PIN NO. / FUNCTION	16	19	24
TV	H	H	L
VDP	H	L	L
VIDEO - 1	L	H	L
VIDEO - 2	L	L	L
VIDEO - 3	H	H	H

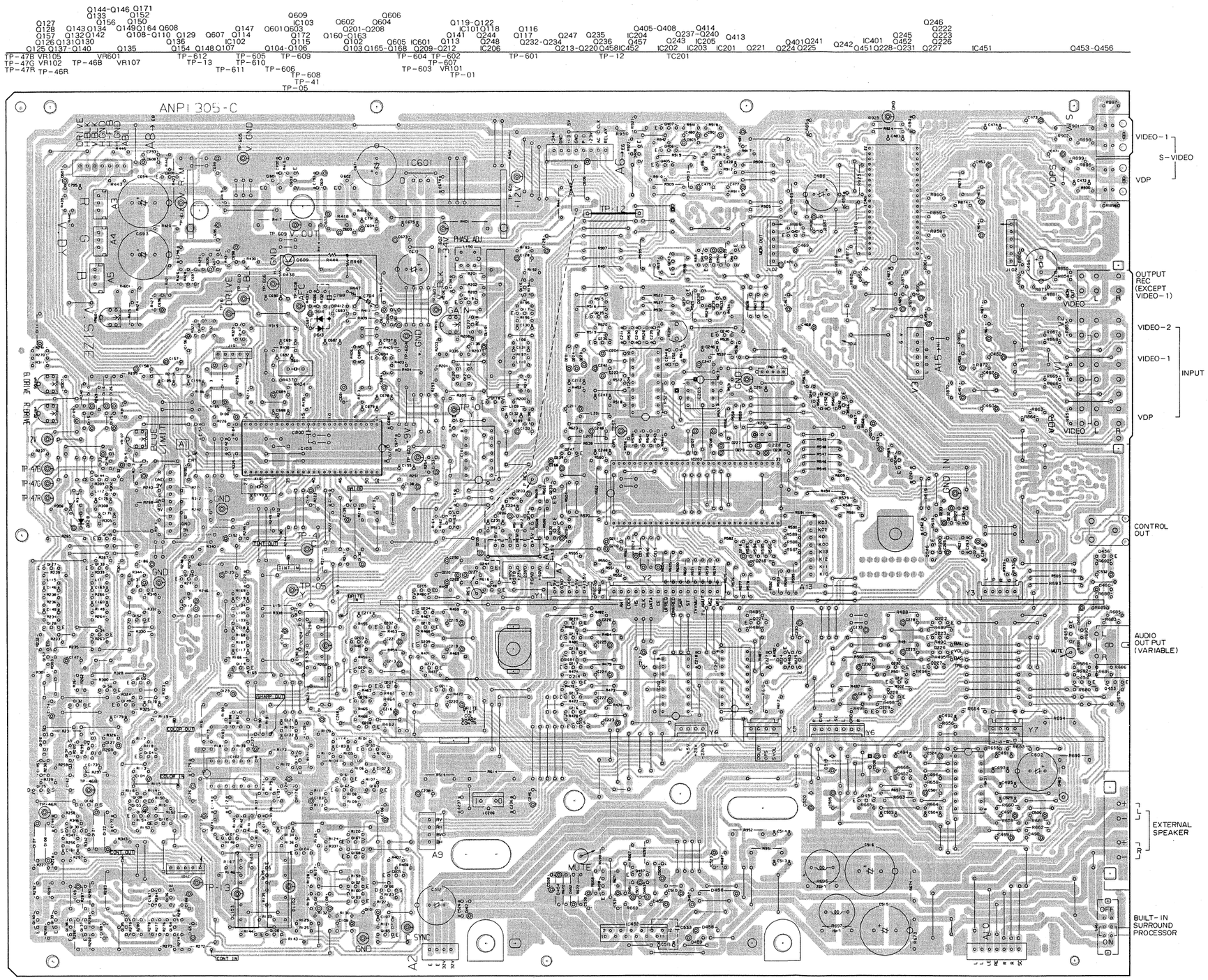
3. VIDEO/AUDIO (3/3), FRONT CONTROL (1/3, 2/3), RECEIVER ASSEMBLIES



4. SURROUND ASSEMBLY

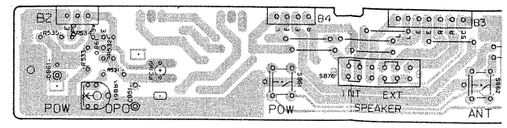


19.3 P.C. BOARDS PATTERN

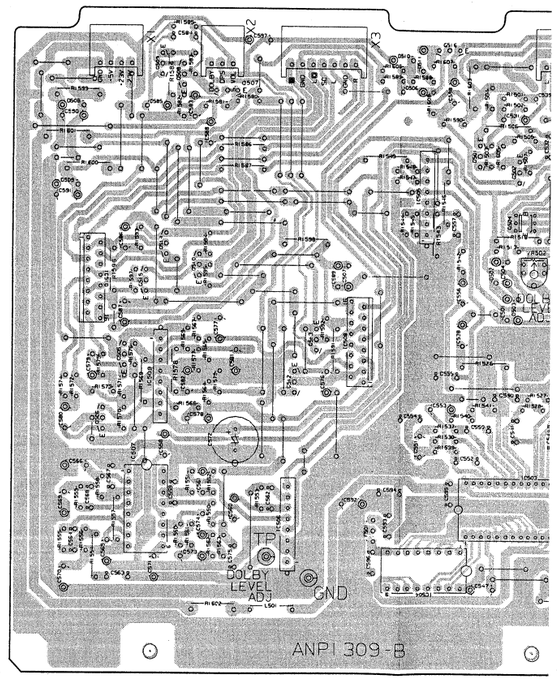


VIDEO/AUDIO ASSEMBLY (AWV1077)

FRONT CONTROL ASSEMBLY (AWZ2540)

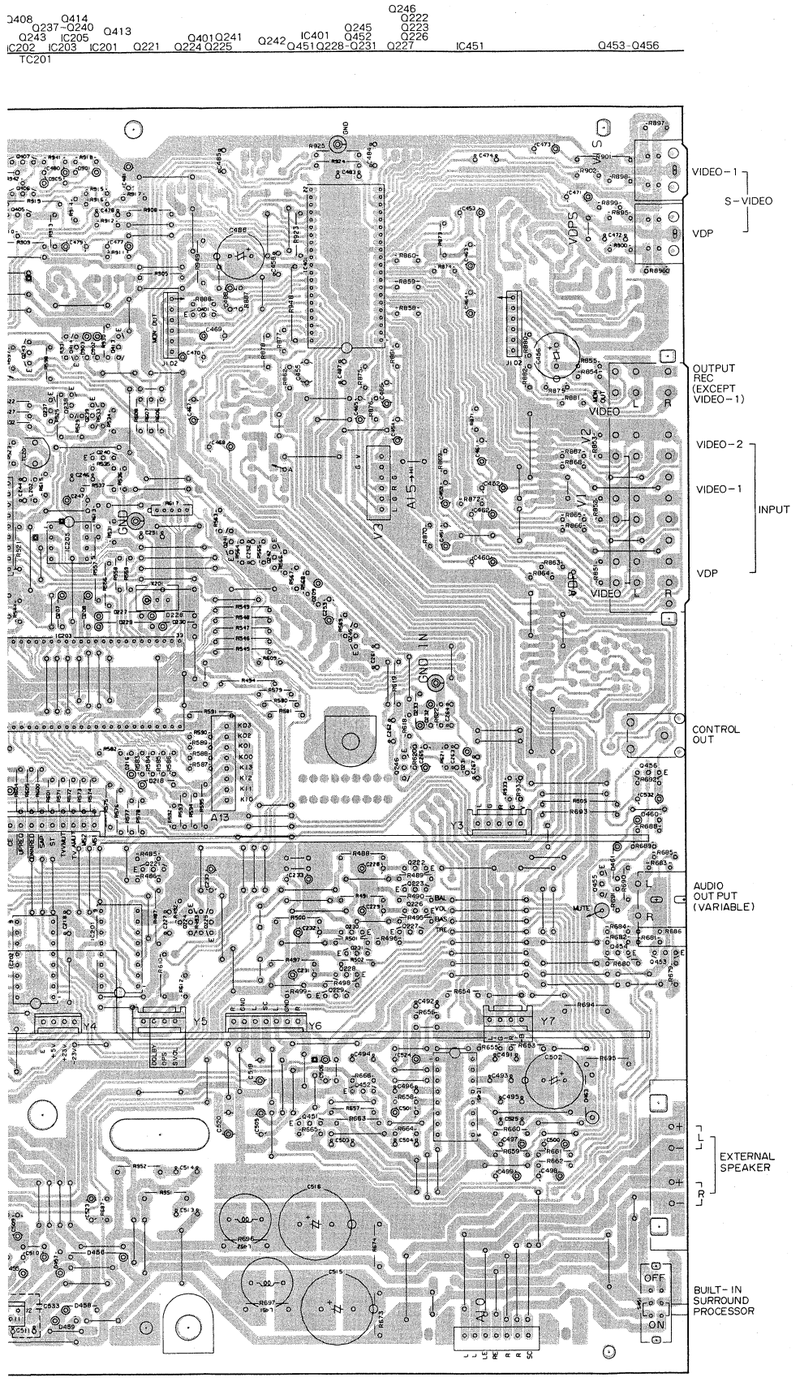


SURROUND ASSEMBLY (AWV1085)

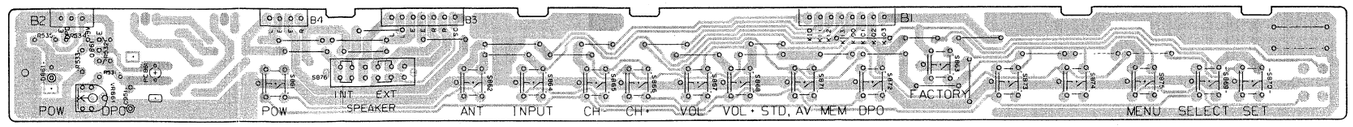


TP-DOLBY LEVEL ADJ VR502

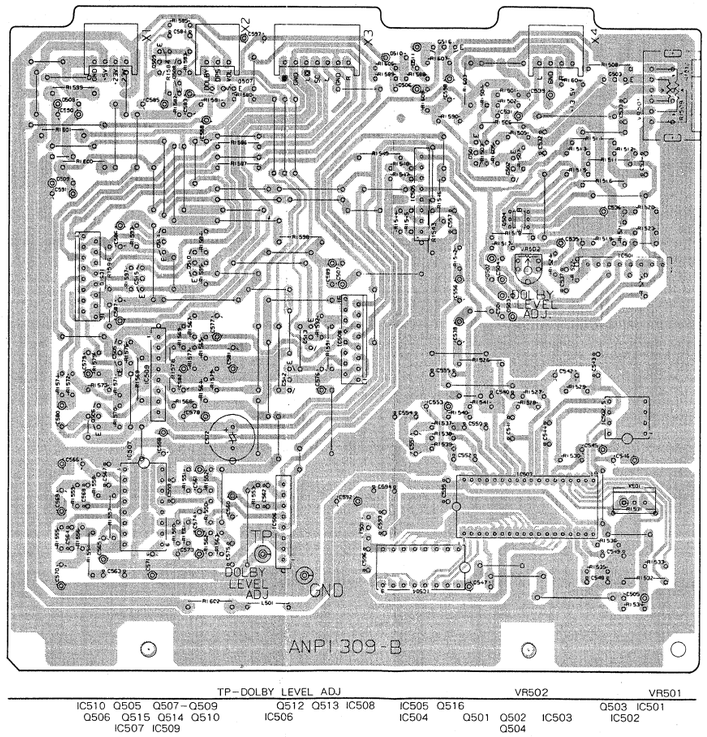
IC510 Q505 Q507-Q509 Q512 Q513 IC508 IC505 Q516
Q506 Q515 Q514 Q510 IC506 IC504 Q501 Q502
IC507 IC509 Q504



FRONT CONTROL ASSEMBLY (AWZ2540)



SURROUND ASSEMBLY (AWV1085)



NOTE

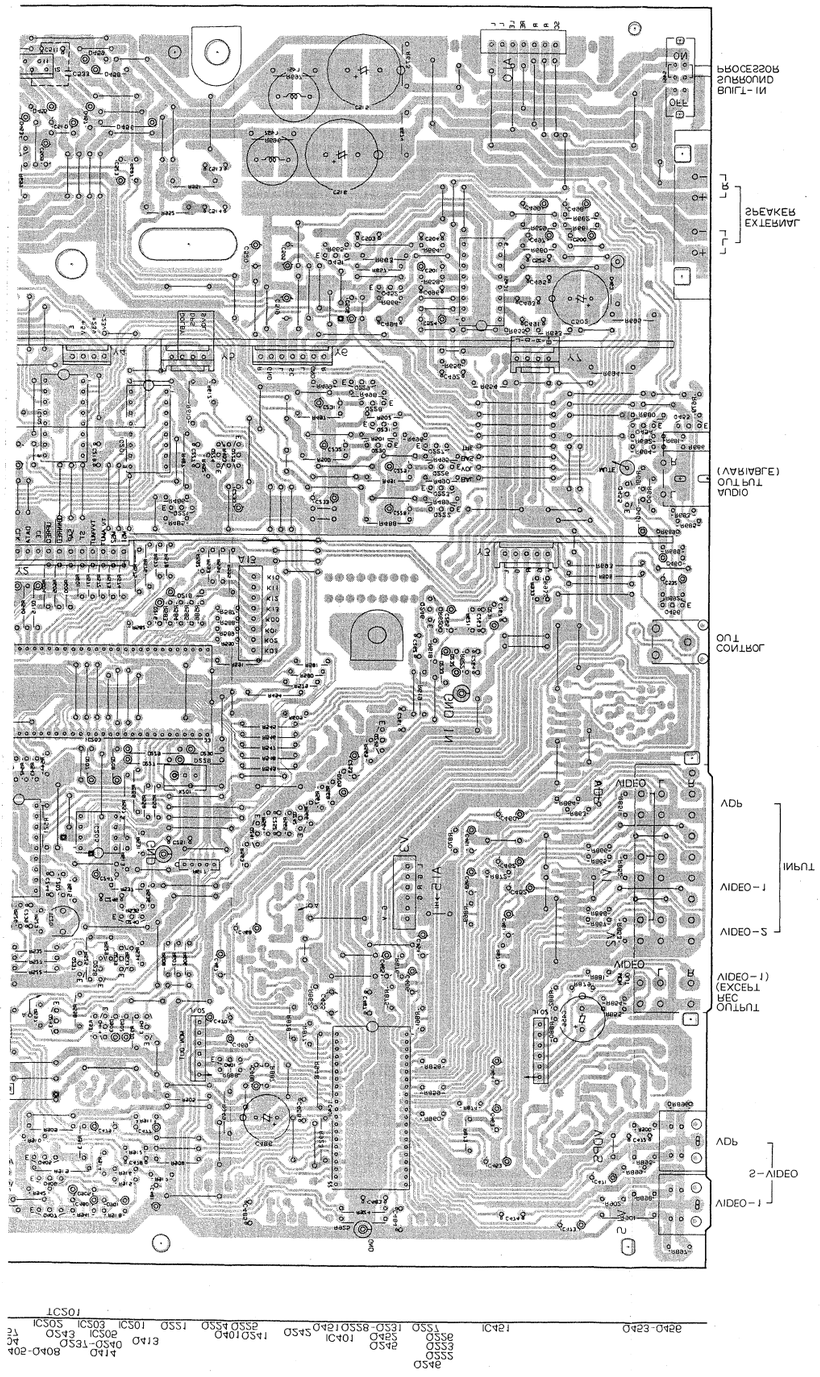
1. This P.C.B connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the following Table.

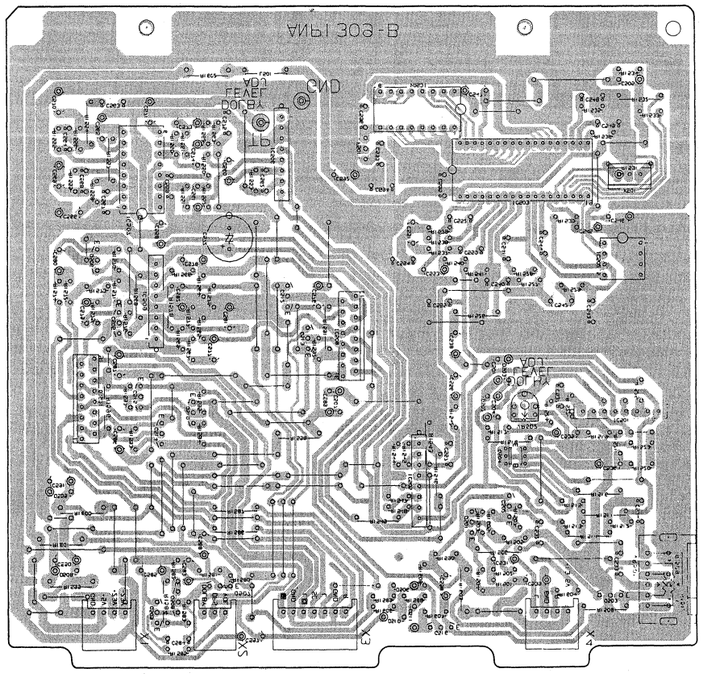
P.C.B. pattern diagram indication	Corresponding part symbol	Part Name
Q504 E	E or E	Transistor
Q215	or	Radiator type transistor
D203	D203	Diode
R237	R237	Resistor
C513	+	Capacitor (Polarity)
C518		Capacitor (Non-polarity)

Others

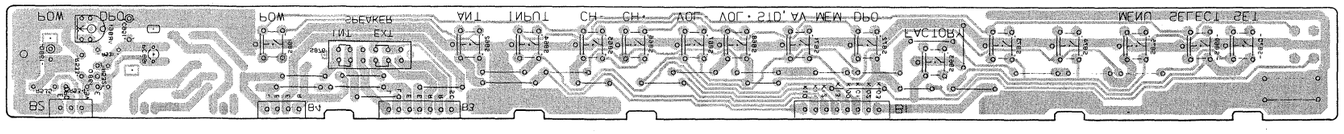
P.C.B. pattern diagram indication	Part Name
IC	IC
S	Switch
RY	Relay
L	Coil
F	Filter
VR	Variable resistor or Semi-fixed resistor

3. The capacitor terminal marked with ⓞ (double circles) shows negative terminal.
4. The diode terminal marked with ⓞ (double circles) shows cathode side.
5. The transistor terminal to which E is affixed shows the emitter.





SURROUND ASSEMBLY (AWV1080)



FRONT CONTROL ASSEMBLY (AWZ5240)

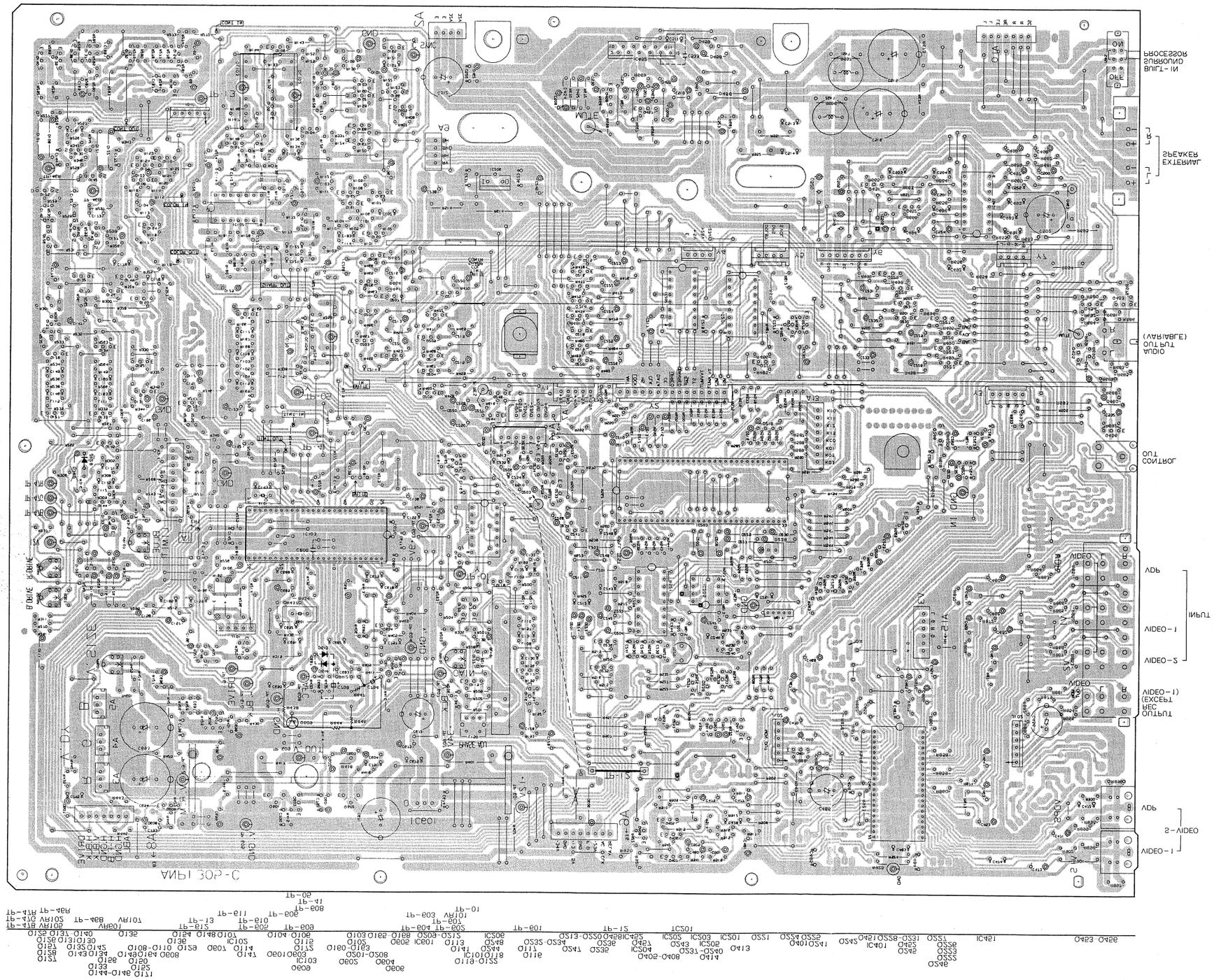
This P.C.B. connection diagram is viewed from the foil side.

SD-P4232-D\KUXJC
SD-P2032-D

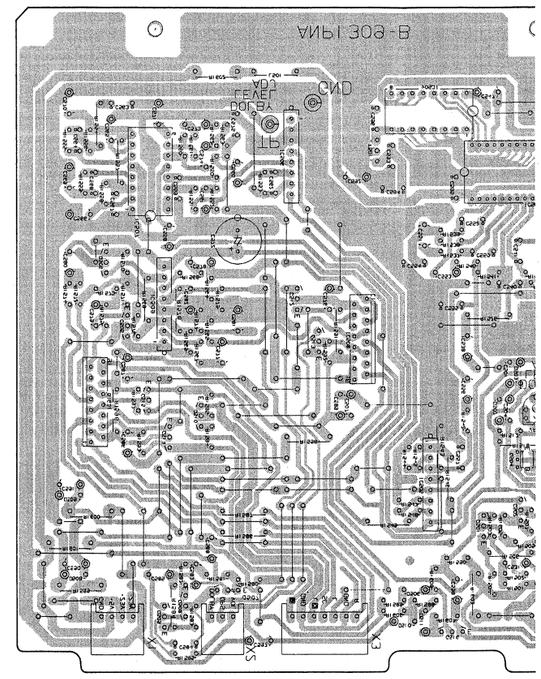
1 2 3 4 5 6 7 8 9 180

A B C D

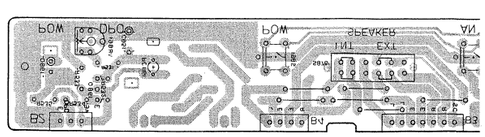
VIDEO\AUDIO ASSEMBLY (AWV1077)



SURROUND ASSEMBLY (AWV1082)



FRONT CONTROL ASSEMBLY (AWZ2240)



P.C. BOARDS PATTERN